Fig. 1

Network Configuration Chart

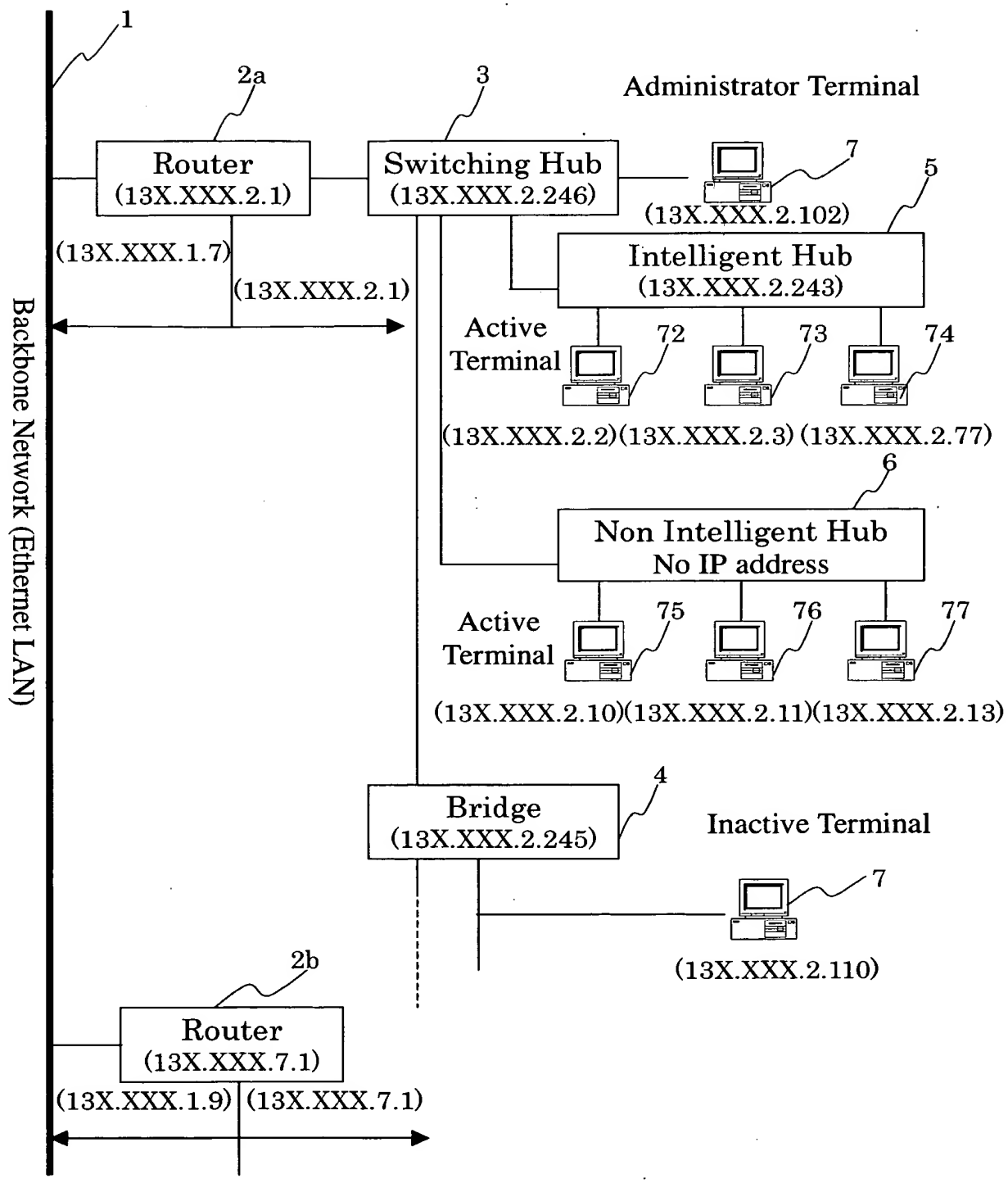


Fig. 2

SNMP Message Format

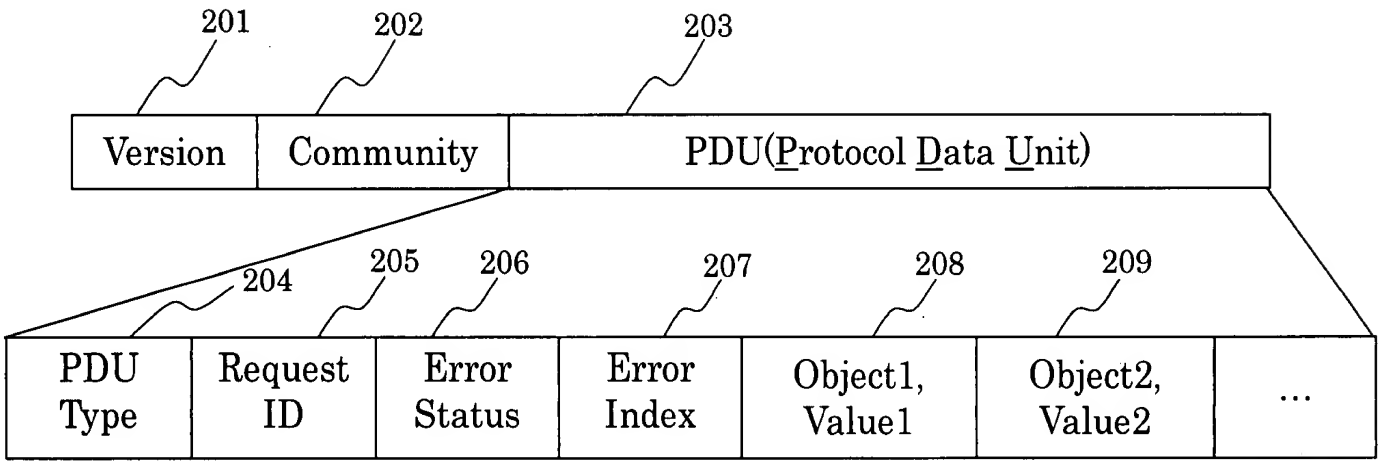


Fig. 3

Internet OID (Object Identifier) Tree

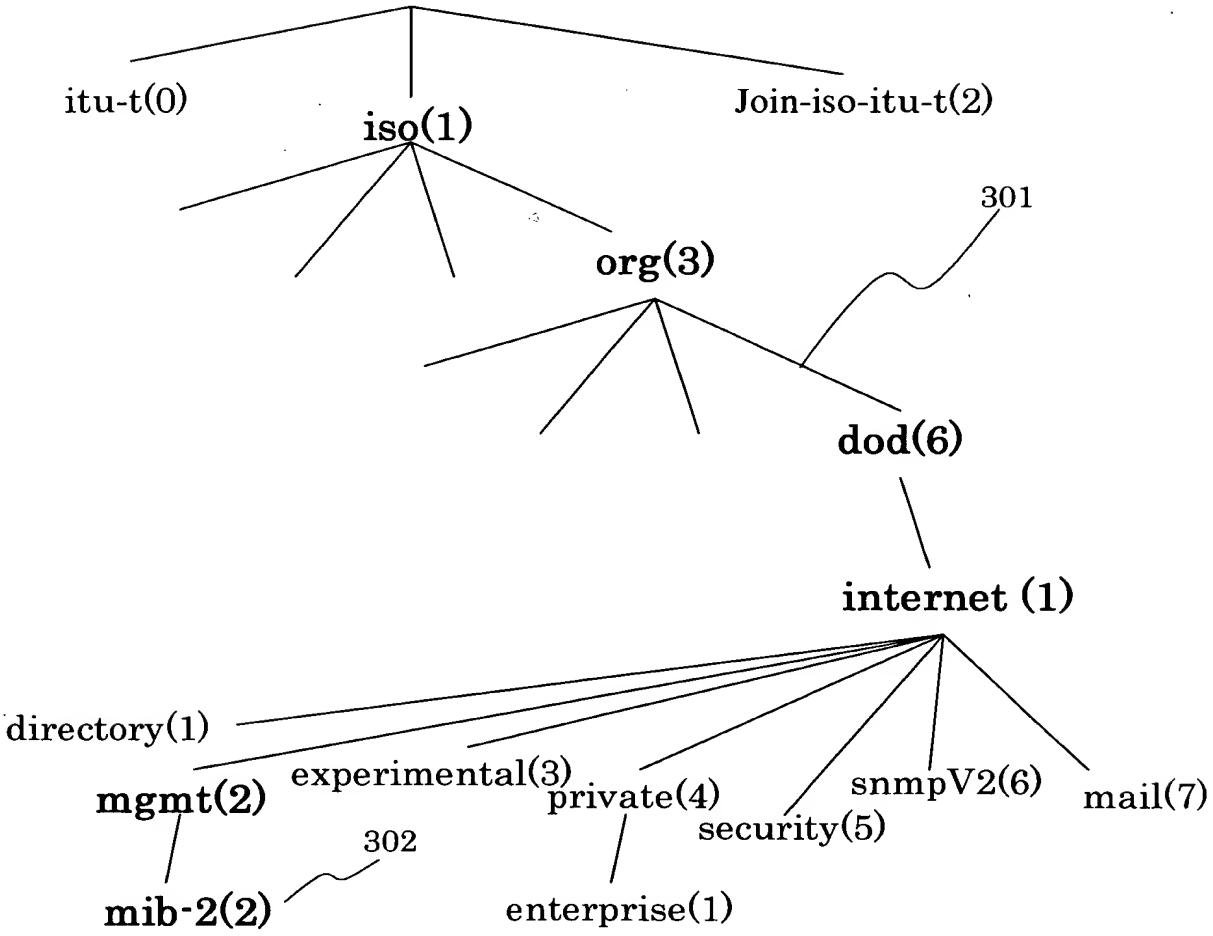


Fig. 4

MIB2 Object Configuration

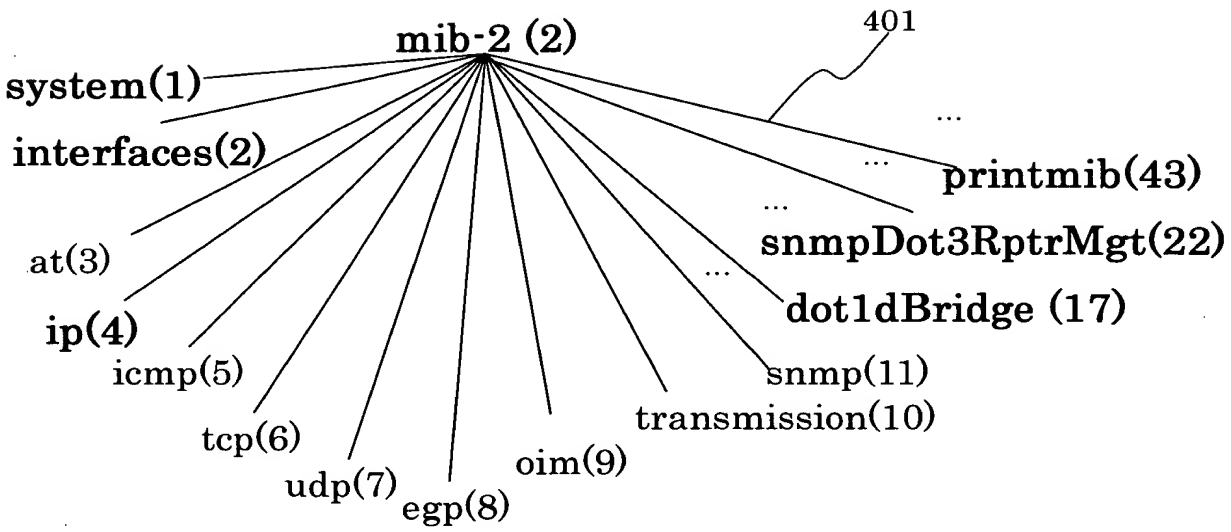


Fig. 5

interfaces Group Object Configuration

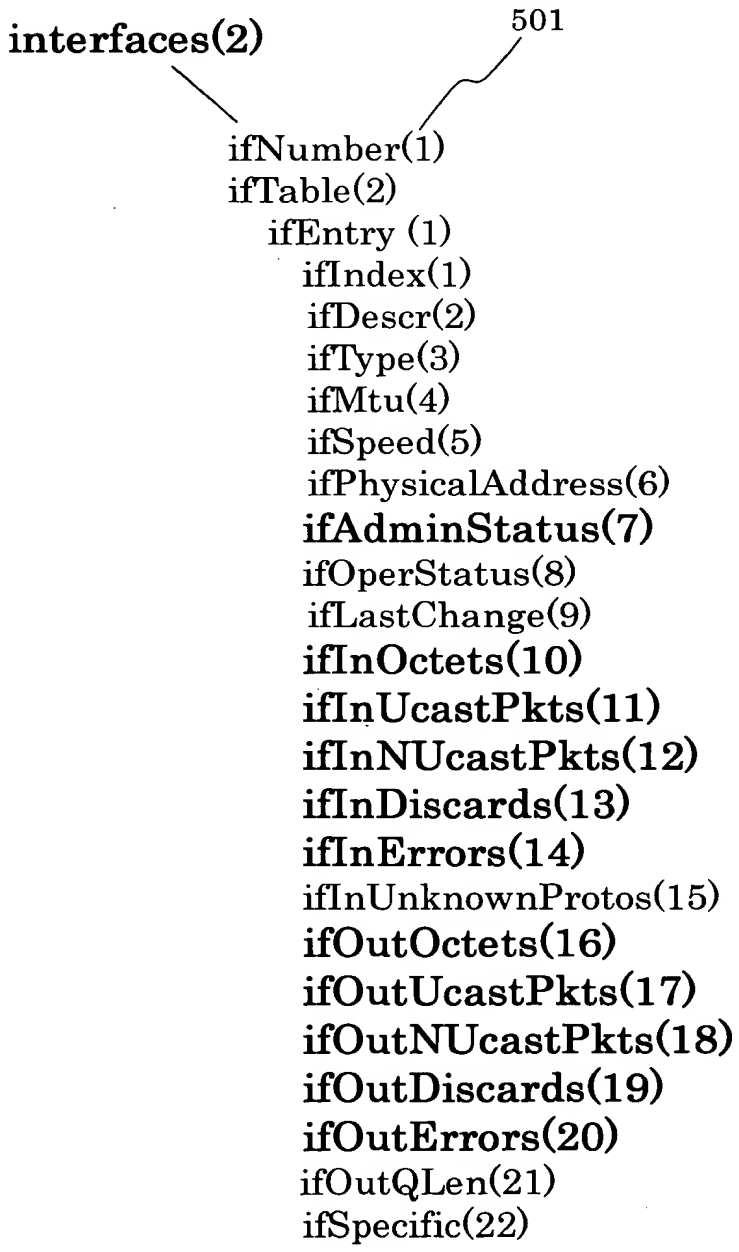


Fig. 6

Program Configuration Chart

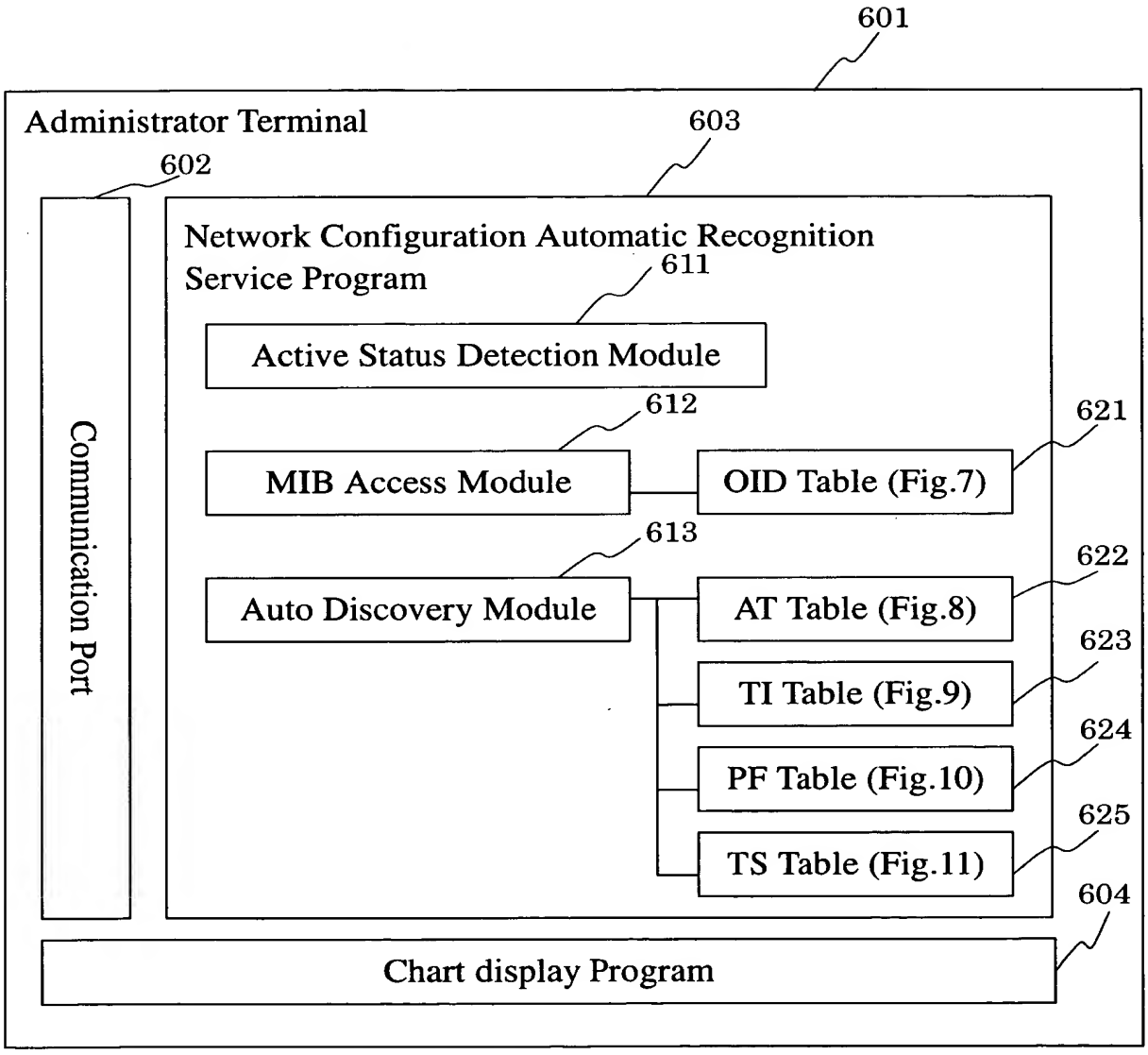


Fig. 7

OID(Object IDentifier) Table Configuration Chart

621

701 Object Name	702 Object Identifier	703 type	704 Object Path
sysDescr	43.6.1.2.1.1.1.0	String	system.sysDescr
sysObjectID	43.6.1.2.1.1.2.0	Binary	system.sysObjectID
...	...	...	...

Fig. 8

AT(Address Translation) Table Configuration Chart

622

801 IP Address	802 Mac Address
13X.XXX.2.1	00:e0:f7:26:a4:e3
13X.XXX.2.2	08:00:20:11:ee:73
...	...

Fig. 9

TI (Terminal Information) Table Configuration Chart

623

901 IP Address	902 Mac Address	903 Host Name	904 type	905 alive	906 mib2	907 forwarding	908 bridge	909 repeater	910 print
13X.XXX.2.	00:e0:f7:26:a4:e3	ori-irouter.ori.xxx.co.jp	R	On	On	On	On	Off	Off
13X.XXX.2.	08:00:20:a1:33:ab	ori.ori.xxx.co.jp	T	On	On	Off	Off	Off	Off
13X.XXX.2.	–	–	–	On	Off	Off	Off	Off	Off
…	…	…	…	…	…	…	…	…	…

(U:Unkown:0,R:Router:1,SH:SwitchingHub:2,IH:IntelligentHub:3,
B:Bridge:4,R:Repeater:5,T:Terminal:6,P:Printer:7)(On:1,Off:0)

Fig. 10

PF(Port Forwarding) Table Configuration Chart

624

1001 Source IP Address	1002 Source Mac Address	1003 Source Port	1004 Destination IP Address	1005 Destination Mac Address
13X.XXX.2.1	00:e0:f7:26:a4:e3	2	13X.XXX.2.2	08:00:20:a1:33:ab
		2	13X.XXX.2.102	00:e0:18:00:27:d7
		...	...	...
		2	13X.XXX.2.246	08:00:4e:4f:ad:27
...	...	...	...	...
13X.XXX.2.246	08:00:4e:4f:ad:27	2	13X.XXX.2.1	00:e0:f7:26:a4:e3
...	...	...	...	...

Fig. 11

TS(Tree Structure) Table Configuration Chart

625

1101 Terminal IP Address	1102 Terminal Mac Address	1103 Terminal Port	1104 Parent IP Address	1105 Parent Mac Address	1106 Parent Port
13X.XXX.2.1	00:e0:f7:26:a4:e3	–	–	–	–
13X.XXX.2.246	08:00:4e:4f:ad:27	2	13X.XXX.2.1	00:e0:f7:26:a4:e3	2
13X.XXX.2.102	00:e0:18:00:27:d7	–	13X.XXX.2.246	08:00:4e:4f:ad:27	3
…	…	…	…	…	…
13X.XXX.2.243	00:00:f4:71:01:37	1	13X.XXX.2.246	08:00:4e:4f:ad:27	1
…	…	…	…	…	…
13X.XXX.2.2	08:00:20:a1:33:ab	–	13X.XXX.2.243	00:00:f4:71:01:37	2
…	…	…	…	…	…

Fig. 12

Mechanism of Sending/Receiving SNMP

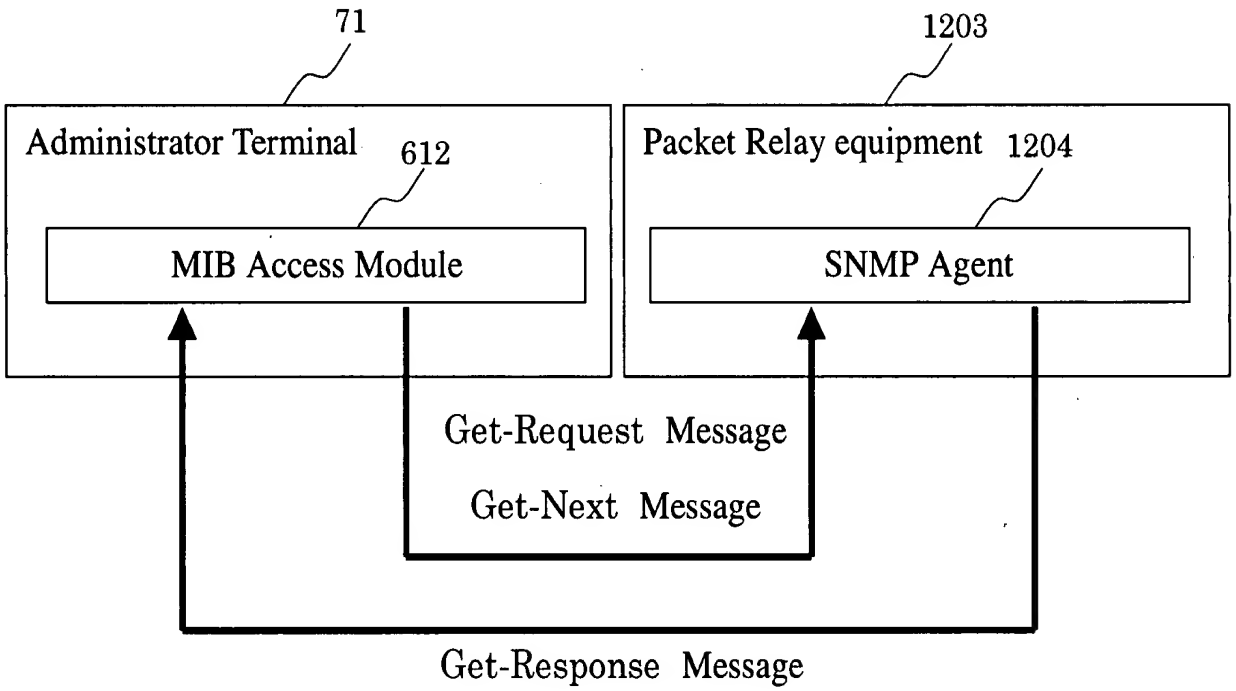


Fig. 13

Method of Detecting Device Type

Device / MIB	Router	Bridge	Switching Hub	Intelligen Hub	Non Intelligent Hub (Repeater)	Printer	Terminal
ip Group ipForwarding Object	○ (Value =1)	○ (Value =0)	○ (Value =1 or Value=0)	○ (Value =0)	—	○ (Value =0)	○ (Value =0)
dot1dBridge Group Any Object	○	○	○	×	—	×	×
snmpDot3Rptr Mgt Group Any Object	×	×	○	○	—	×	×
printmib Group Any Object	×	×	×	×	—	○	×

Note)(○ : Implemented, × : Unimplemented, — : MIB Unsupported)

Fig. 14

Definition Diagram of Packet Relay Equipment Relation

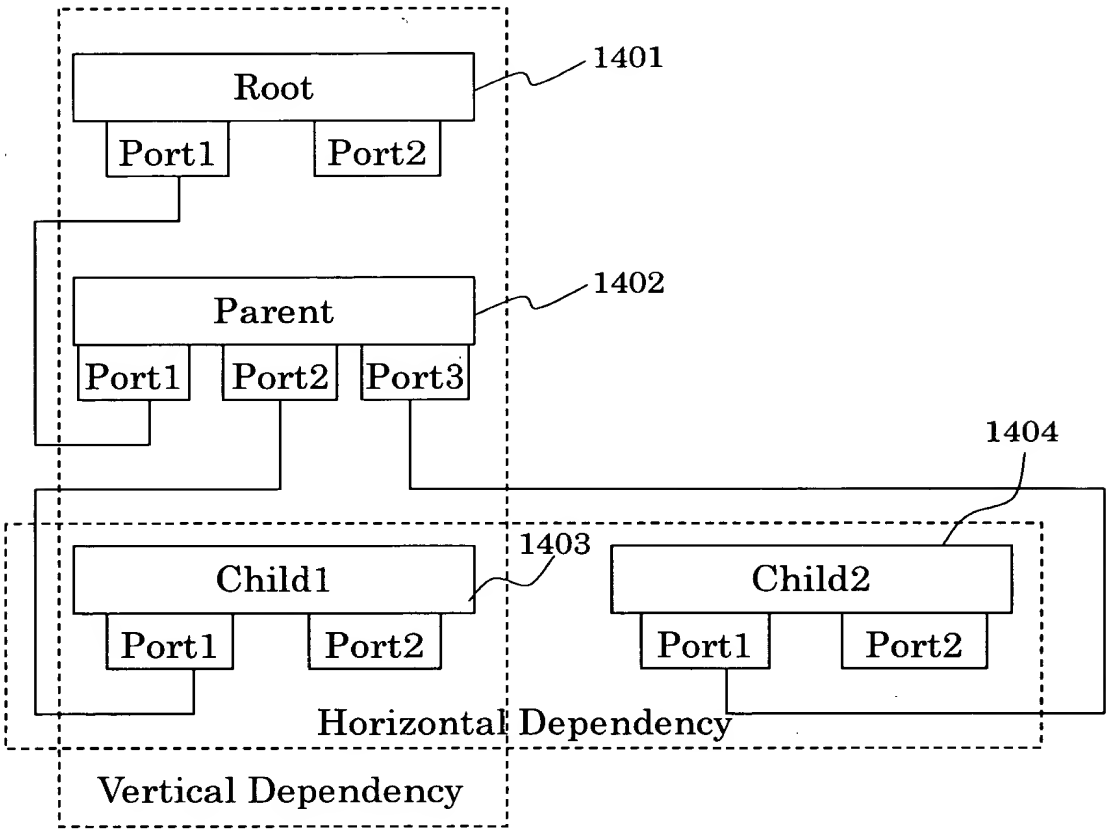
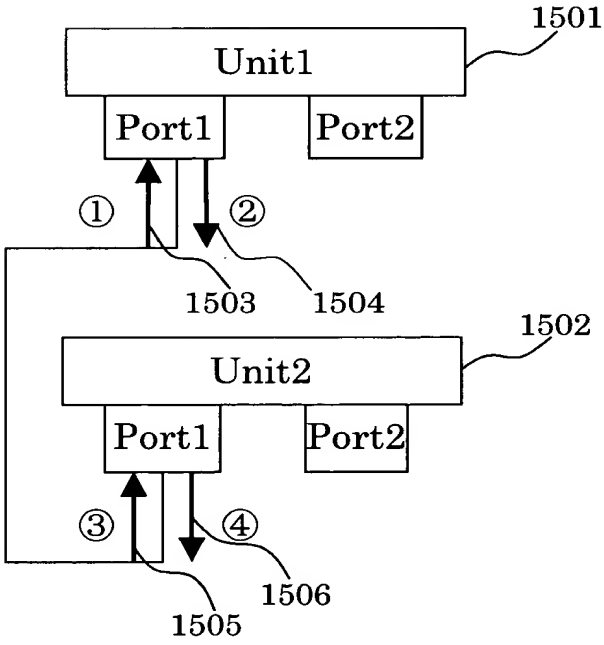


Fig. 15

Detection of Connection between Pieces of Packet Relay Equipment by Using interfaces MIB



[Information to acquire]

① ifInOctets(Port1 of Unit1)
② ifOutOctets(Port1 of Unit1)
③ ifInOctets(Port1 of Unit2)
④ ifOutOctets(Port1 of Unit2)

[Detection conditions]

· No significant difference between ① and ④
· No significant difference between ② and ③
→ Port1 of Unit 1 and Port 2 of Unit 2 are in connection

Fig. 16

Network Device Classification

Network Device	Description
R	Packet relay equipment for segment division (Router)
CF	Packet relay equipment that has no imperfection in MIB object information stored and can create PF table listing all the connection ports of the packet relay equipment and terminals
IF	Packet relay equipment that has some imperfections in MIB object information stored and sometimes fails to detect connection port numbers to other pieces of packet relay equipment excepting R
SF	Packet relay equipment that has some imperfections in MIB object information stored, cannot detect any of the ports connected to all the other pieces of packet relay equipment including R, and can detect the port(s) connected to one or more terminals
NF	Packet relay equipment holding no MIB (Non Intelligent Hub, Repeater)
Term	Device other than packet relay equipment (Printer, Terminal)

Fig. 17

Mechanism of Connection Detection for R-CF-* Model
(* represents any one of CF2,IF2,SF2)

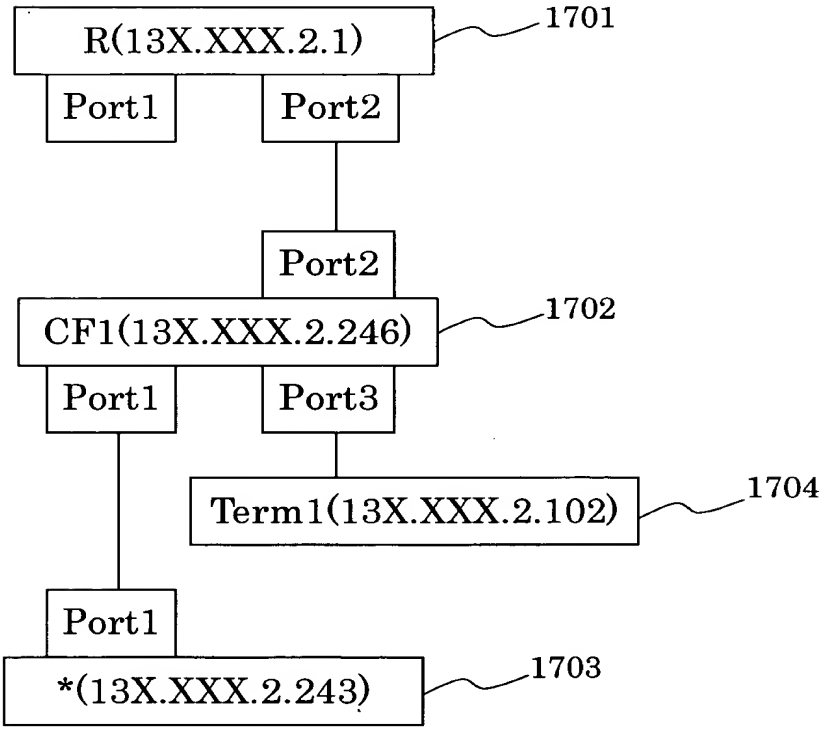


Fig. 18

PF Table Entry for Use in Connection Detection for R-CF-* Model

Model

624

Source IP Address	Source Mac Address	Source Port	Destination IP Address	Destination Mac Address
...	...	...	...	...
13X.XXX.2.246	08:00:4e:4f:ad:27	1	13X.XXX.2.243	00:00:f4:71:01:37
13X.XXX.2.246	08:00:4e:4f:ad:27	2	13X.XXX.2.1	00:e0:f7:26:a4:e3
13X.XXX.2.246	08:00:4e:4f:ad:27	3	13X.XXX.2.102	00:e0:18:00:27:d7
...	...	...	...	...
13X.XXX.2.243	00:00:f4:71:01:37	1	13X.XXX.2.102	00:e0:18:00:27:d7
13X.XXX.2.243	00:00:f4:71:01:37	1	13X.XXX.2.1	00:e0:f7:26:a4:e3
...	...	...	...	...

1801

1802

1803

1804

1805

Fig. 19

Mechanism of Connection Detection for R-IF-* Model
(* represents any one of CF2,IF2,SF2)

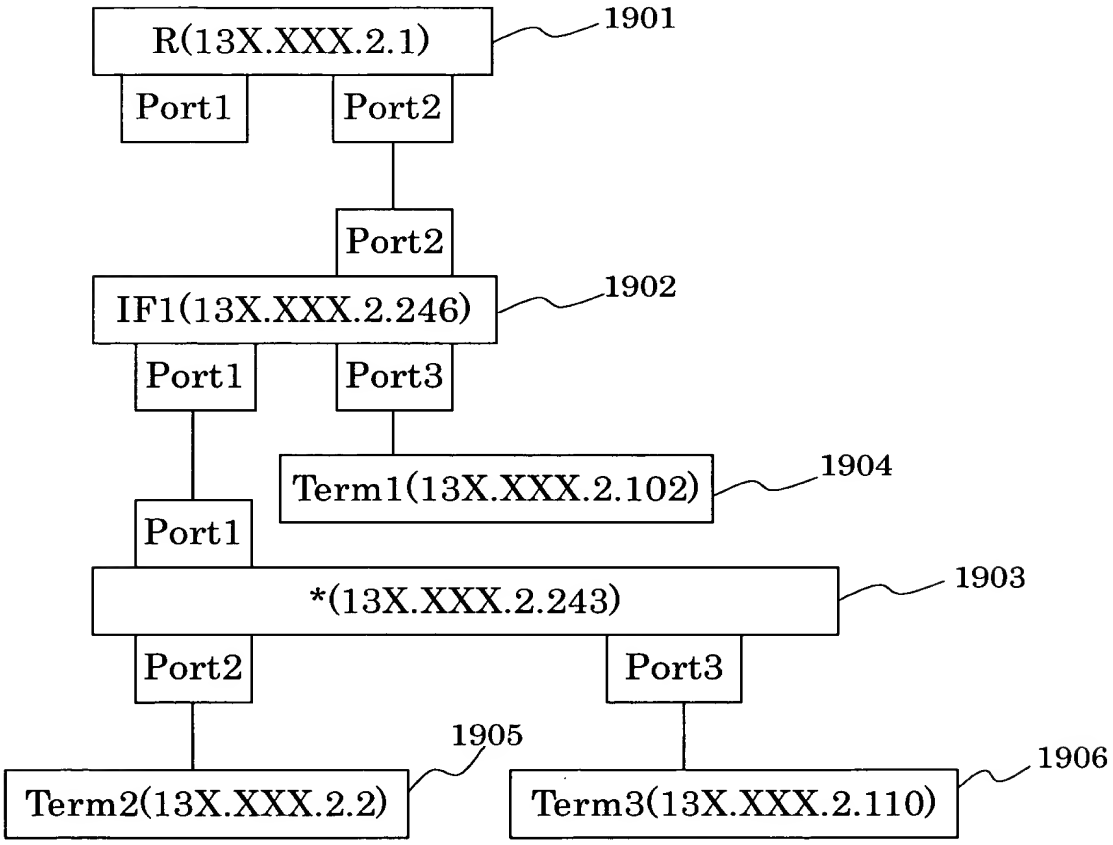


Fig. 20

PF Table Entry for Use in Connection Detection for R-IF-* Model

624

Source IP Address	Source Mac Address	Source Port	Destination IP Address	Destination Mac Address
...	...	...	...	...
13X.XXX.2.246	08:00:4e:4f:ad:27	1	13X.XXX.2.2	00:e0:f7:26:a4:e3
13X.XXX.2.246	08:00:4e:4f:ad:27	1	13X.XXX.2.110	00:e0:18:00:3a:9f
13X.XXX.2.246	08:00:4e:4f:ad:27	3	13X.XXX.2.102	00:e0:18:00:27:d7
13X.XXX.2.246	08:00:4e:4f:ad:27	2	13X.XXX.2.1	00:e0:f7:26:a4:e3
...	...	...	...	...
13X.XXX.2.243	00:00:f4:71:01:37	1	13X.XXX.2.102	00:e0:18:00:27:d7
13X.XXX.2.243	00:00:f4:71:01:37	2	13X.XXX.2.2	00:e0:f7:26:a4:e3
13X.XXX.2.243	00:00:f4:71:01:37	3	13X.XXX.2.110	00:e0:18:00:3a:9f
13X.XXX.2.243	00:00:f4:71:01:37	1	13X.XXX.2.1	00:e0:f7:26:a4:e3
13X.XXX.2.243	00:00:f4:71:01:37	1	13X.XXX.2.246	08:00:4e:4f:ad:27
...	...	...	...	...

2001
2002
2003
2004
2005
2006
2007
2008
2009

Fig. 21

Mechanism of Connection Detection for R-SF-* Model
(* represents any one of CF2,IF2,SF2)

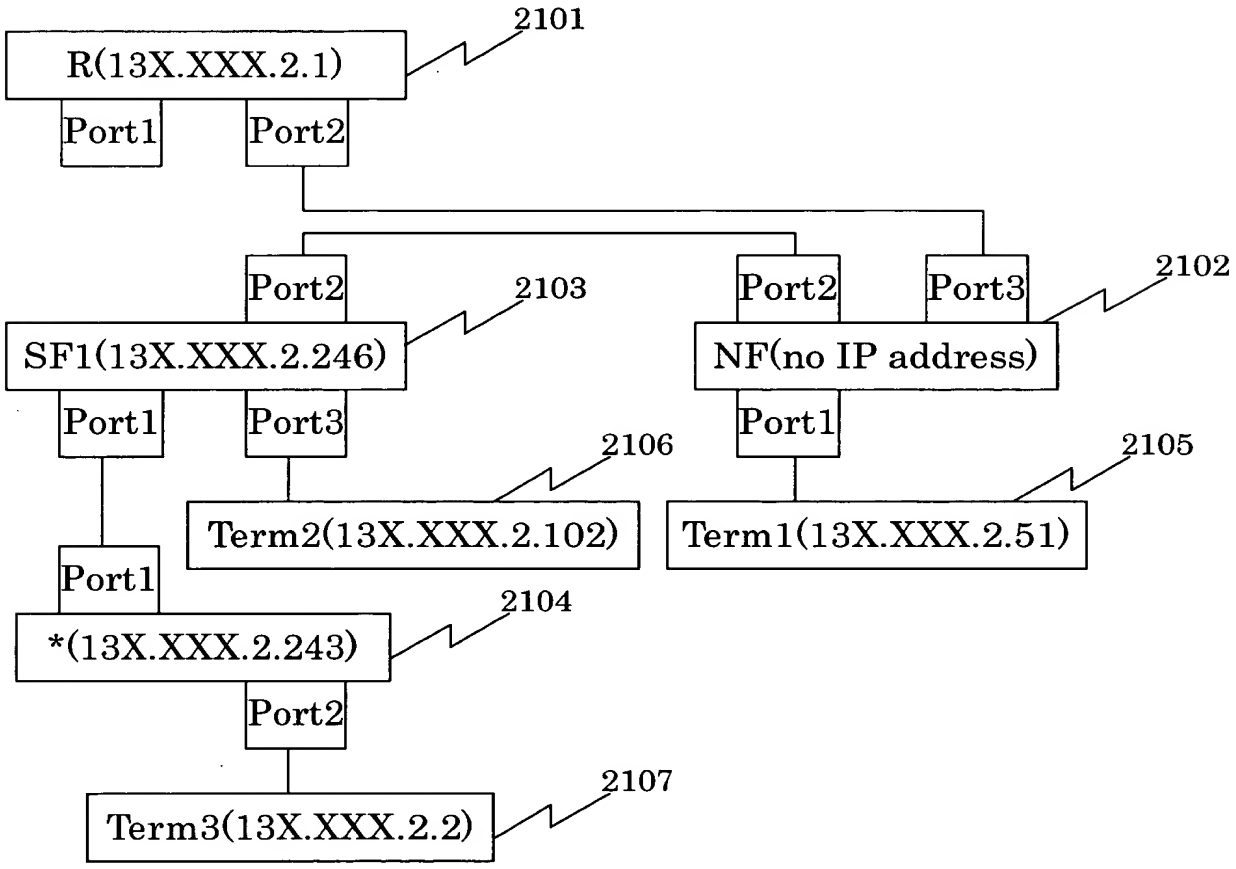


Fig. 22

PF Table Entry for Use in Connection Detection for R-SF-IF Model

624

Source IP Address	Source Mac Address	Source Port	Destination IP Address	Destination Mac Address	
...	...	...	...	...	2201
13X.XX.2.246	08:00:4e:4f:ad:2	1	13X.XXX.2.2	00:e0:f7:26:a4:e3	2202
13X.XXX.2.246	08:00:4e:4f:ad:2	2	13X.XXX.2.51	00:00:92:96:b4:43	2203
13X.XXX.2.246	08:00:4e:4f:ad:2	3	13X.XXX.2.102	00:e0:18:00:27:d7	
...	...	...	...	...	2204
13X.XXX.2.243	00:00:f4:71:01:3	1	13X.XXX.2.51	00:00:92:96:b4:43	2205
13X.XXX.2.243	00:00:f4:71:01:3	1	13X.XXX.2.102	00:e0:18:00:27:d7	2206
13X.XXX.2.243	00:00:f4:71:01:3	2	13X.XXX.2.2	00:e0:f7:26:a4:e3	2207
13X.XXX.2.243	00:00:f4:71:01:3	1	13X.XXX.2.1	00:e0:f7:26:a4:e3	2208
13X.XXX.2.243	00:00:f4:71:01:3	1	13X.XXX.2.246	08:00:4e:4f:ad:27	
...	...	...	...	...	

Fig. 23

Mechanism of Connection Detection for R-* Model
(* represents any one of CF,IF,SF)

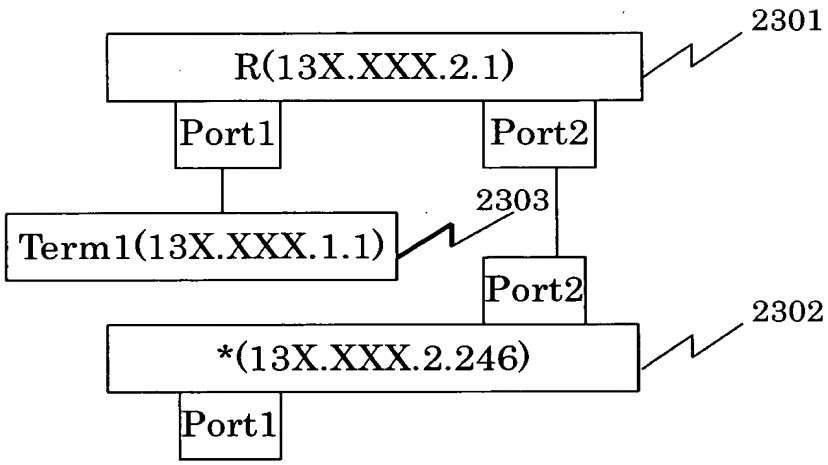


Fig. 24

PF Table Entry for Use in Connection Detection for R-* Model

624

Source IP Address	Source Mac Address	Source Port	Destination IP Address	Destination Mac Address
...	...	...	...	...
13X.XXX.2.1	00:e0:f7:26:a4:e3	2	13X.XXX.1.246	08:00:4e:4f:ad:27
13X.XXX.2.246	08:00:4e:4f:ad:27	1	13X.XXX.1.1	08:00:20:74:d5:86
13X.XXX.2.246	08:00:4e:4f:ad:27	2	13X.XXX.2.1	00:e0:f7:26:a4:e3
...	...	...	...	...

2401

2402

2403

Fig. 25

Method of Detecting Connections among Pieces of Packet Relay Equipment

2501 Connection Model	2502 *1	2503 *2	2504 *3	2505 Condition for Connection Detection
R-CF1-CF2	○	○	○	–
R-CF-IF	○	○	○	–
R-CF-SF	○	△	○	(1)one or more devices connected to ports other than connection port of CF to SF (2)device(s) of (1) stored in SF forwarding table
R-IF-CF	○	△	△	(1) one or more devices connected to ports other than connection port of CF to IF (2) device(s) of (1) stored in IF forwarding table
R-IF1-IF2	△	△	△	(1) one or more devices connected to ports other than connection port of IF1 to R (2) device(s) of (1) stored in R-containing port entries of IF2 forwarding table (3) one or more devices connected to ports other than connection port of IF2 to R (4) device(s) of (3) stored in port entries of IF1 forwarding table except R-containing port entries
R-IF-SF	△	△	△	(1) two or more devices connected to ports other than connection port of IF to R (2) device(s) of (1) stored in particular port entries of SF forwarding table (3) device(s) of (1) other than those of (2) stored in port entries of SF forwarding table except those of (2) (4) one or more devices connected to ports other than connection port of IF to R, except ports of (1) (5) device(s) of (4) stored in particular port entries of SF forwarding table

Note)
*1 : Parent-to-Child Connection Port
*2 : Child-to-Parent Connection Port
*3 : Vertical Dependency

○ : connection detectable
△ : connection detectable if the condition for connection detection is satisfied
× : connection undetectable

Fig. 26

Method of Detecting Connections among Pieces of Packet Relay Equipment

2601 Connection Model	2602 *1	2603 *2	2604 *3	2605 Condition for Connection Detection
R-SF-CF	△	○	×	(1) one or more devices connected to ports other than connection port of CF to SF (2) device(s) of (1) stored in particular port entries of SF forwarding table
R-SF-IF	△	△	×	(1) more than two device connected to the same port as connection port of IF to R (2) devices of (1) stored in particular port entries of SF forwarding table (3) devices of (1) other than those of (2) stored in port entries of SF forwarding table except those of (2) (4) one or more devices connected to ports other than the connection port of IF to R (5) device(s) of (4) connected to particular port entries of SF forwarding table
R-SF1-SF2	×	×	×	—
R-CF	△	○	○	R forwarding table includes port with internal network IP address
R-IF	△	○	○	R forwarding table includes port with internal network IP address
R-SF	△	△	○	(1) R forwarding table includes port with internal network IP address (2) SF forwarding table includes port with backbone network IP address

Note)
*1 : Parent-to-Child Connection Port
*2 : Child-to-Parent Connection Port
*3 : Vertical Dependency

○ : connection detectable
△ : connection detectable if the condition for connection detection is satisfied
× : connection undetectable

Fig. 27

Mechanism of Connection Detection for *-TERM Model
(* represents any one of CF,IF,SF)

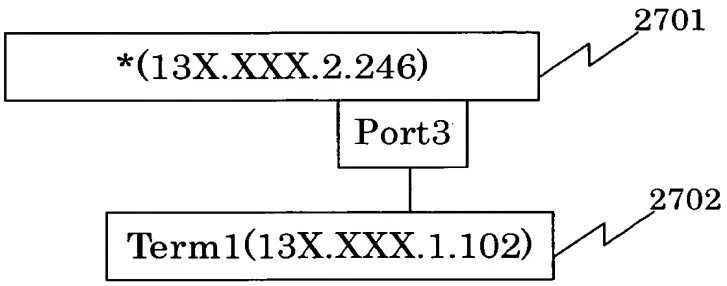


Fig. 28

PF Table Entry for Use in Connection Detection for *-TERM Model

624

Source IP Address	Source Mac Address	Source Port	Destination IP Address	Destination Mac Address
...	...	...	...	...
13X.XXX.2.246	08:00:4e:4f:ad:27	1	13X.XXX.2.102	00:e0:18:00:27:d7
...	...	...	...	...

2801

Fig. 29

Method of Detecting Connection between Packet Relay Equipment and Terminal

2901 Equipment Connection model	2902 Detection of Terminal Connection	2903 Condition for Connection Detection
CF-TERM	○	–
IF-TERM	○	–
SF-TERM	△	One terminal connected to a port

Fig. 30

Detection of Vertical Dependency through Combination of Plurality of Models
(Example of detecting the vertical dependency in R-SF-CF model by combining R-CF-CF model and R-CF-SF model)

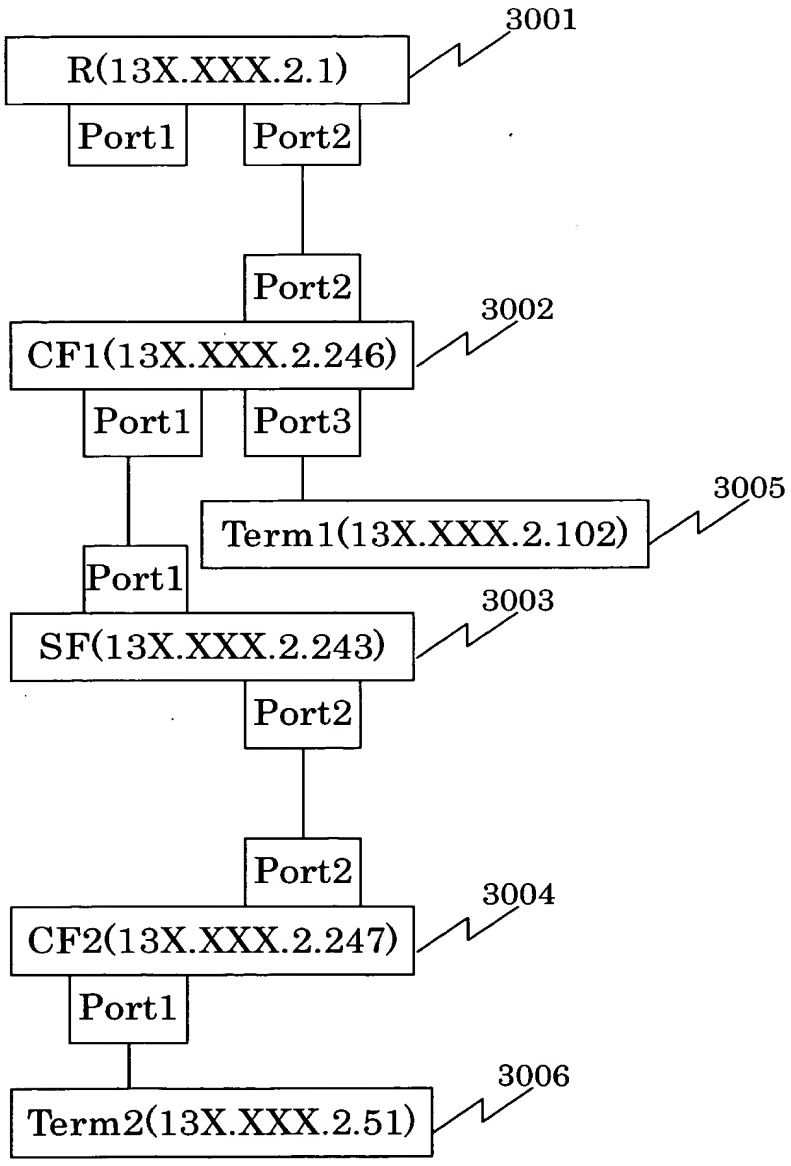


Fig. 31

TS Table Entry for Use in Detection of Vertical Dependency through Combination of a plurality of Models 625

Terminal IP Address	Terminal Mac Address	Terminal Port	Parent IP Address	Parent Mac Address	Parent Port	
...	...	...	...	...	...	
13X.XXX.2.243	00:00:f4:71:01:37	1	13X.XXX.2.246	08:00:4e:4f:ad:27	1	3101
13X.XXX.2.247	00:00:81:39:df:aa	2	13X.XXX.2.246	08:00:4e:4f:ad:27	1	3102
13X.XXX.2.243	00:00:f4:71:01:37	2	13X.XXX.2.247	00:00:81:39:df:aa	2	3103
13X.XXX.2.247	00:00:81:39:df:aa	2	13X.XXX.2.243	00:00:f4:71:01:37	2	3104
...	...	...	...	...	...	

[Conditions]

① when connection is detectable and vertical dependency is not, TS table stores two symmetric entries to indicate this (13X.XXX.2.243 and 13X.xxx.2.247 connected to each other at Port2; vertical dependency unknown)

② both 13X.XXX.2.243 and 13X.XXX.2.247 are child devices of 13X.XXX.2.246, connected through Port1 and Port2, respectively

③ then, 13X.XXX.2.243 is a parent to 13X.XXX.2.247

→ given that 13X.XXX.2.243 is a parent, a contradiction occurs since 13X.XXX.2.246 can be connected via both Port1 and Port2 of 13X.XXX.2.243

→ a contradiction also occurs on the assumption that 13X.XXX.2.243 and 13X.XXX.2.247 are connected to a non intelligent hub and horizontally dependent on each other

Fig. 32

Method of Predicting Connection of Non Intelligent Hub

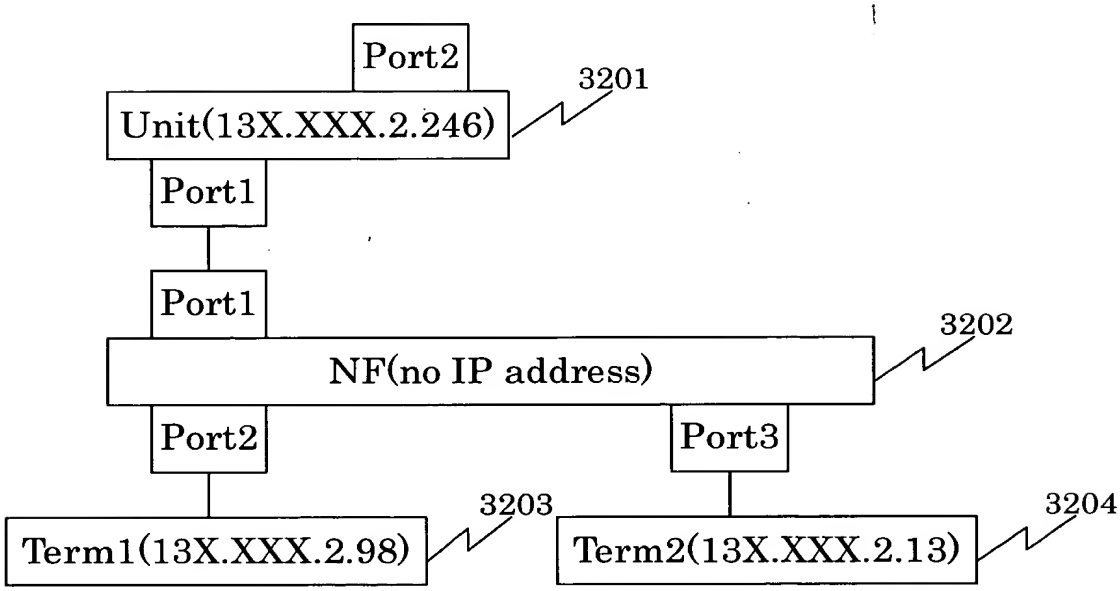


Fig. 33

TS Table Entry for Use in Prediction of Non Intelligent Hub Connection

625

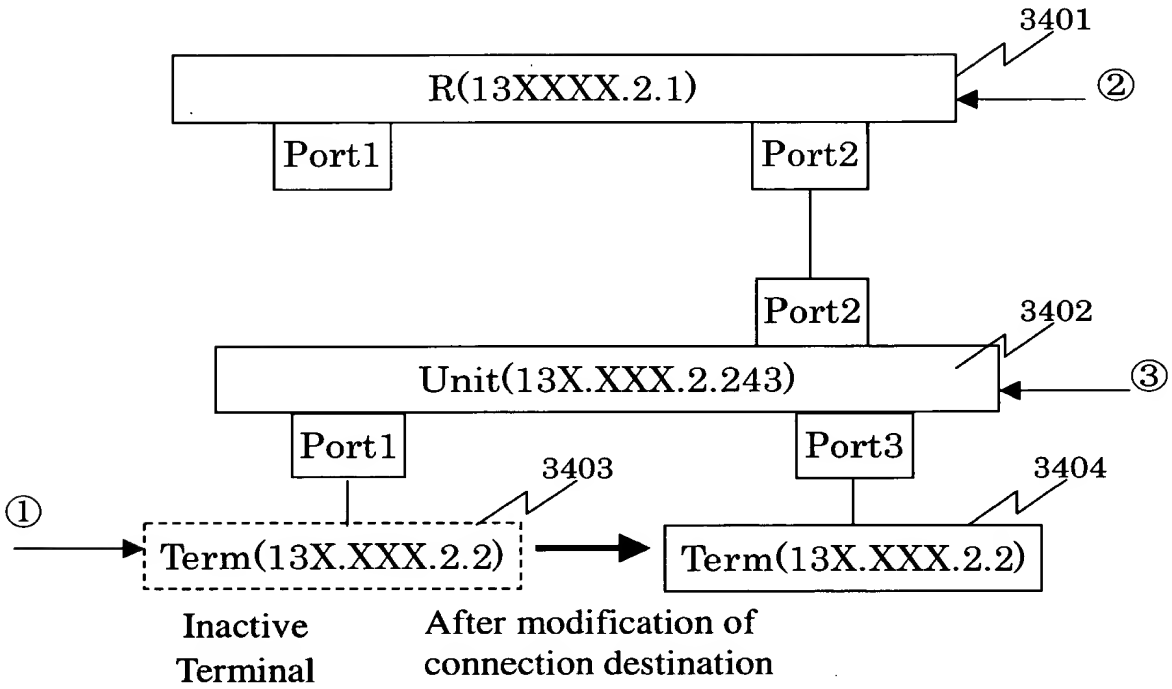
Terminal IP Address	Terminal Mac Address	Terminal Port	Parent IP Address	Parent Mac Address	Parent Port
...	...	...	...	...	...
13X.XXX.2.98	00:60:97:0f:69:e4	–	13X.XXX.2.246	08:00:4e:4f:ad:2	1
13X.XXX.2.13	08:00:09:e1:51:5e	–	13X.XXX.2.24	08:00:4e:4f:ad:27	1
...	...	...	...	...	...

3301

3302

Fig. 34

Detection of Inactive Terminal and Connection Destination Modification



[Conditions]

① inactive terminal (133.108.2.2) returns no response to polling, making FALSE the alive value in corresponding entry in TI table

② an entry of inactive terminal (133.108.2.2) is cached in APR table of Router, allowing creation of AT table entry

③ connection information of inactive terminal (133.108.2.2) is cached in packet relay equipment (133.108.2.243) to which the terminal is connected, allowing creation of PF and TS table entries

Fig. 35

TS Table Entry for Use in Detection of Connection Destination Modification

625

Terminal IP Address	Terminal Mac Address	Terminal Port	Parent IP Address	Parent Mac Address	Parent Port
...	...	...	...	...	...
13X.XXX.2.2	08:00:20:a13X:ab	-	13X.XXX.2.243	00:00:f4:71:01:37	2
...	...	...	...	...	...

3501

After modification of connection destination

Terminal IP Address	Terminal Mac Address	Terminal Port	Parent IP Address	Parent Mac Address	Parent Port
...	...	...	...	...	...
13X.XXX.2.2	08:00:20:a13X:ab	-	13X.XXX.2.243	00:00:f4:71:01:37	2
13X.XXX.2.2	08:00:20:a13X:ab	-	13X.XXX.2.243	00:00:f4:71:01:37	3
...	...	...	...	...	...

3502

3503

Fig .36

Example of Network Configuration Chart Display

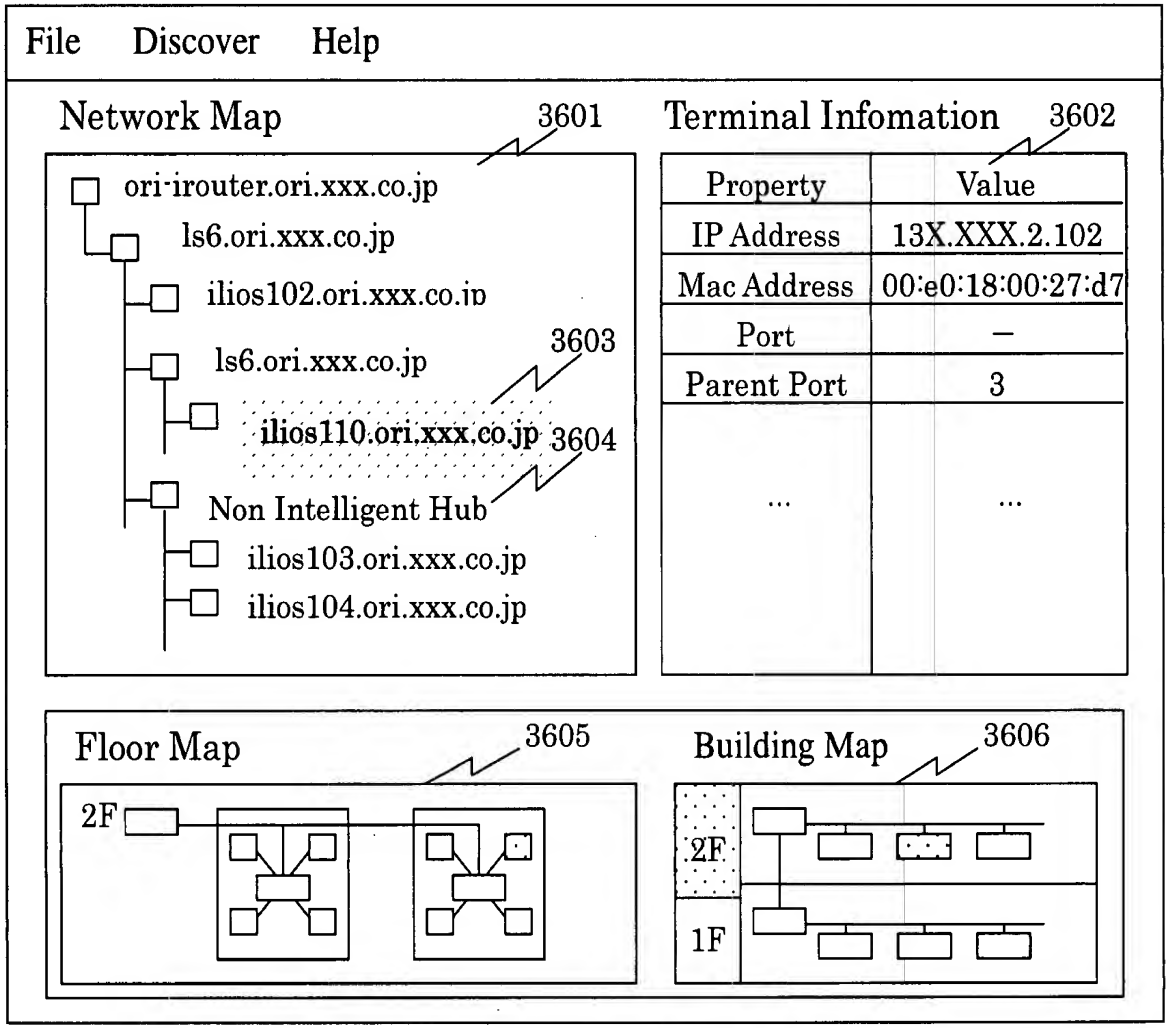


Fig. 37 (a)

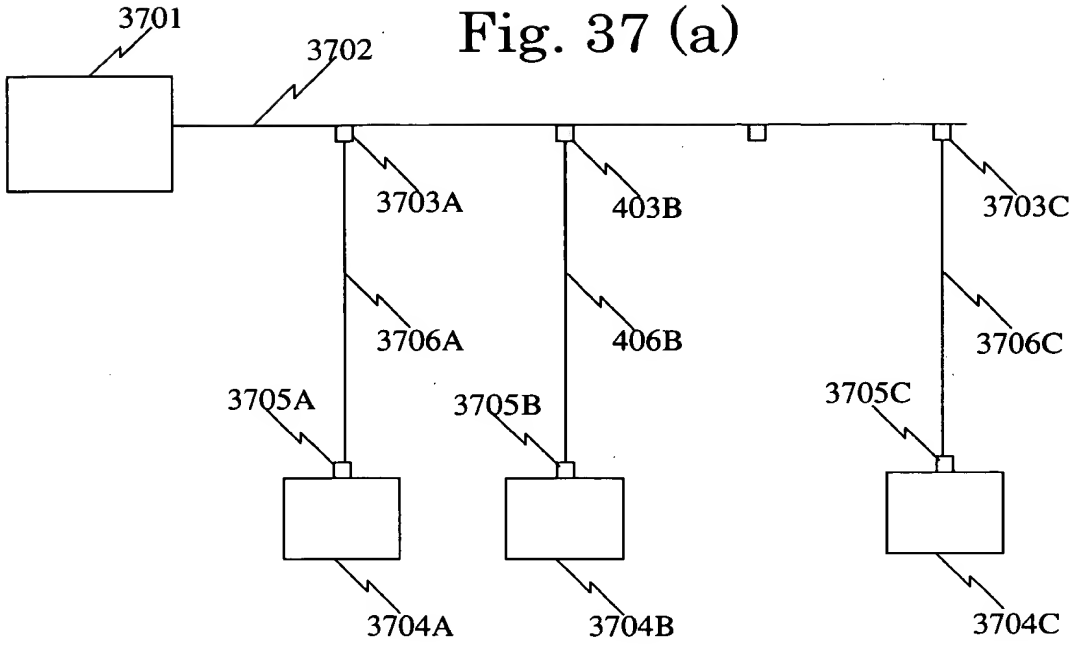


Fig. 37 (b)

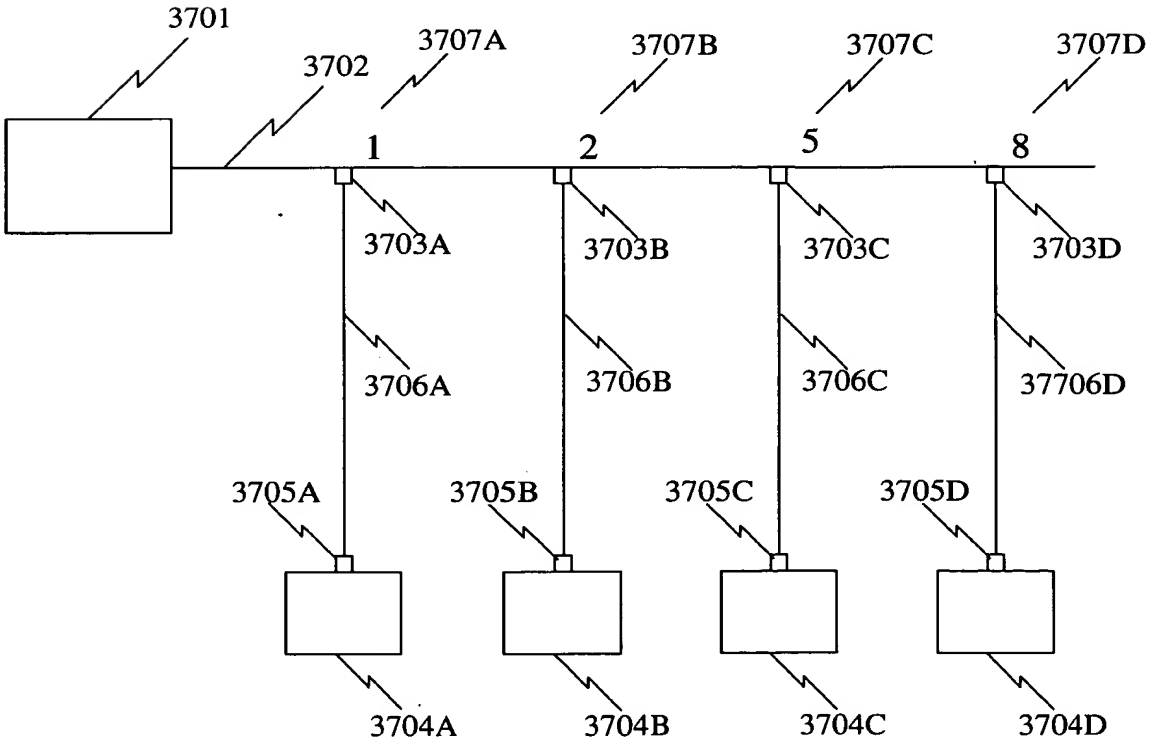


Fig. 38

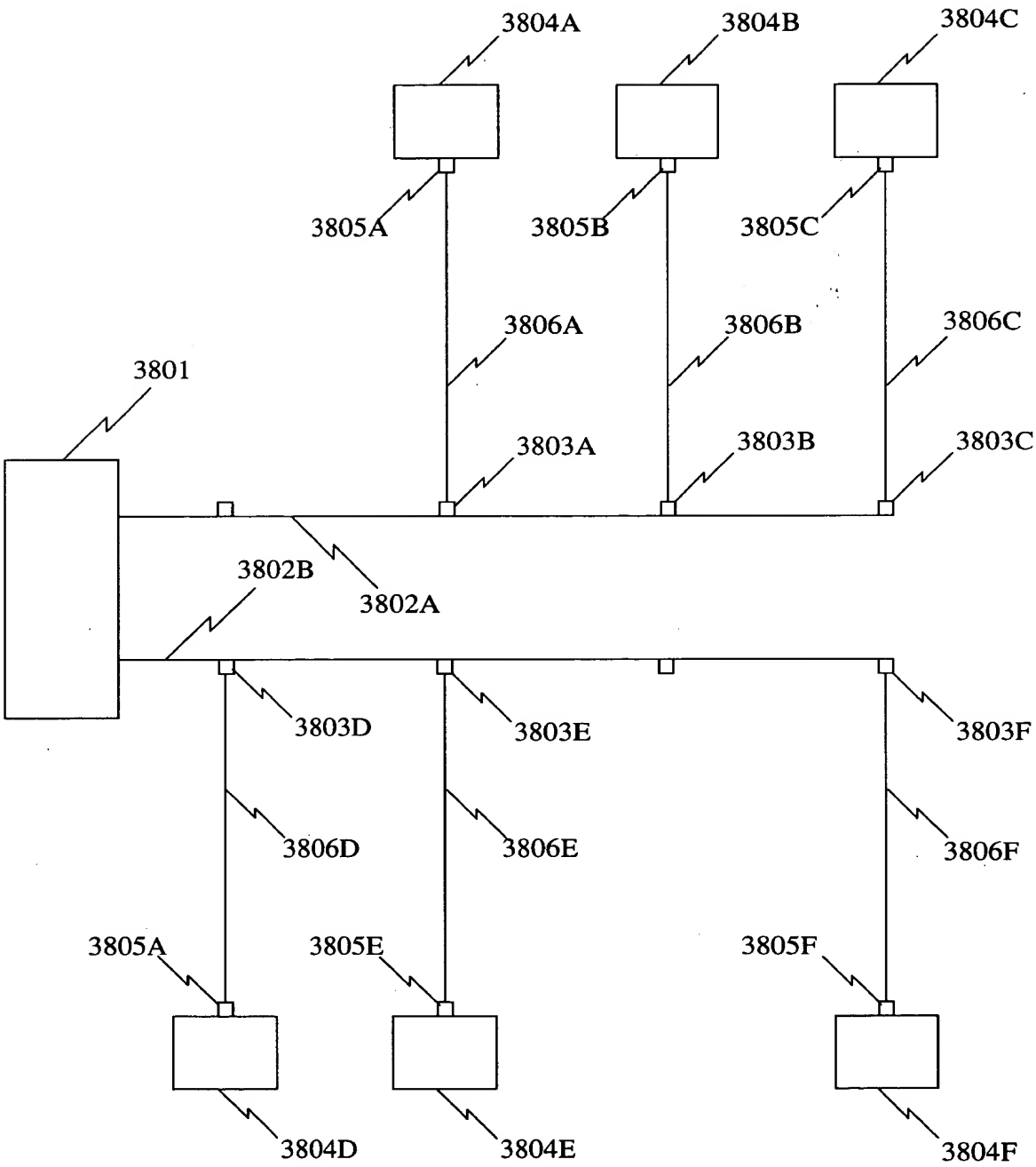

3804A
3804B
3804C
3805A
3805B
3805C
3806A
3806B
3806C
3801
3803A
3803B
3803C
3802B
3802A
3803D
3803E
3803F
3806D
3806E
3806F
3805A
3805E
3805F
3804D
3804E
3804F

Fig. 39

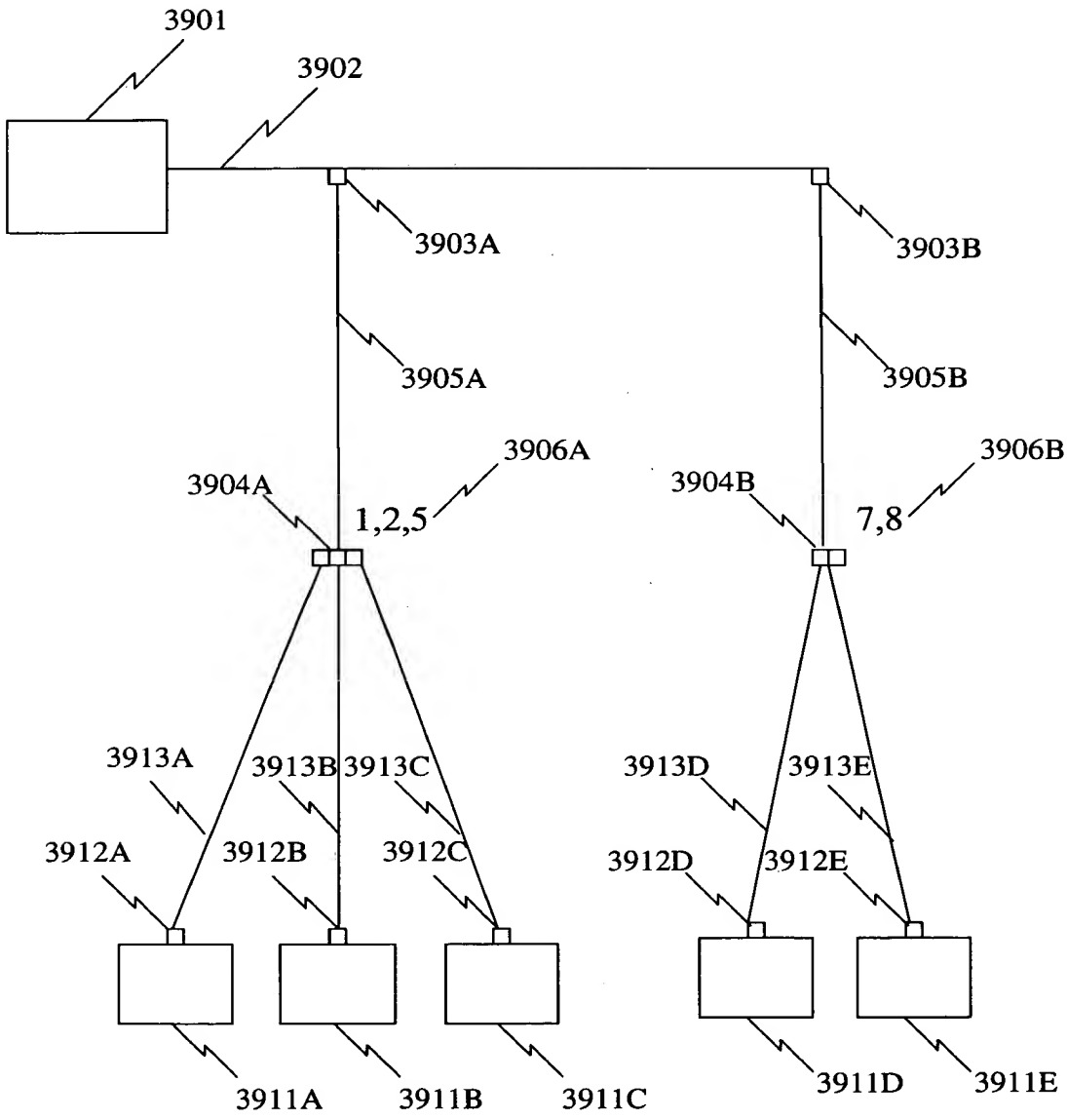

3901
3902
3903A
3903B
3905A
3905B
3906A
3906B
3904A
3904B
1,2,5
7,8
3913A
3913B
3913C
3913D
3913E
3912A
3912B
3912C
3912D
3912E
3911A
3911B
3911C
3911D
3911E

Fig. 40 (a)

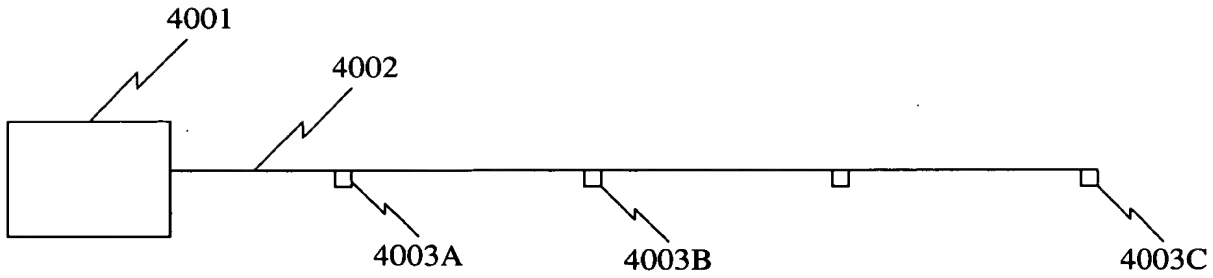


Fig. 40 (b)

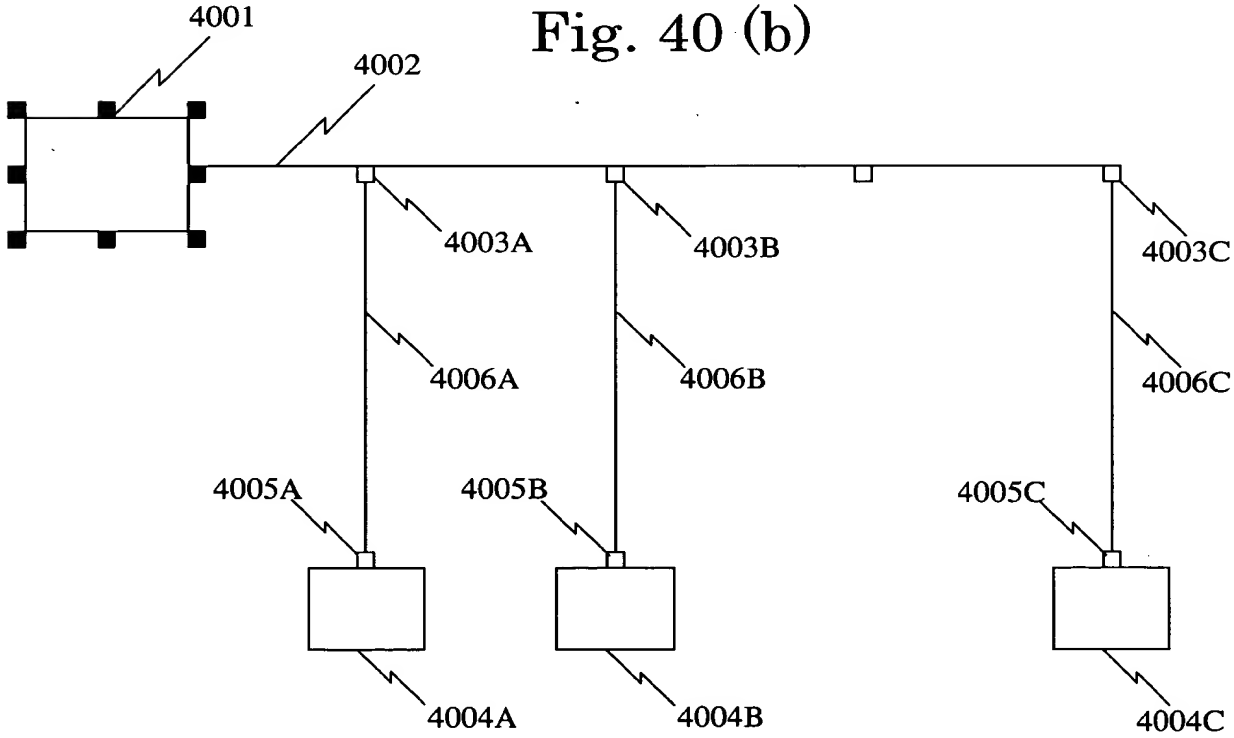


Fig. 41

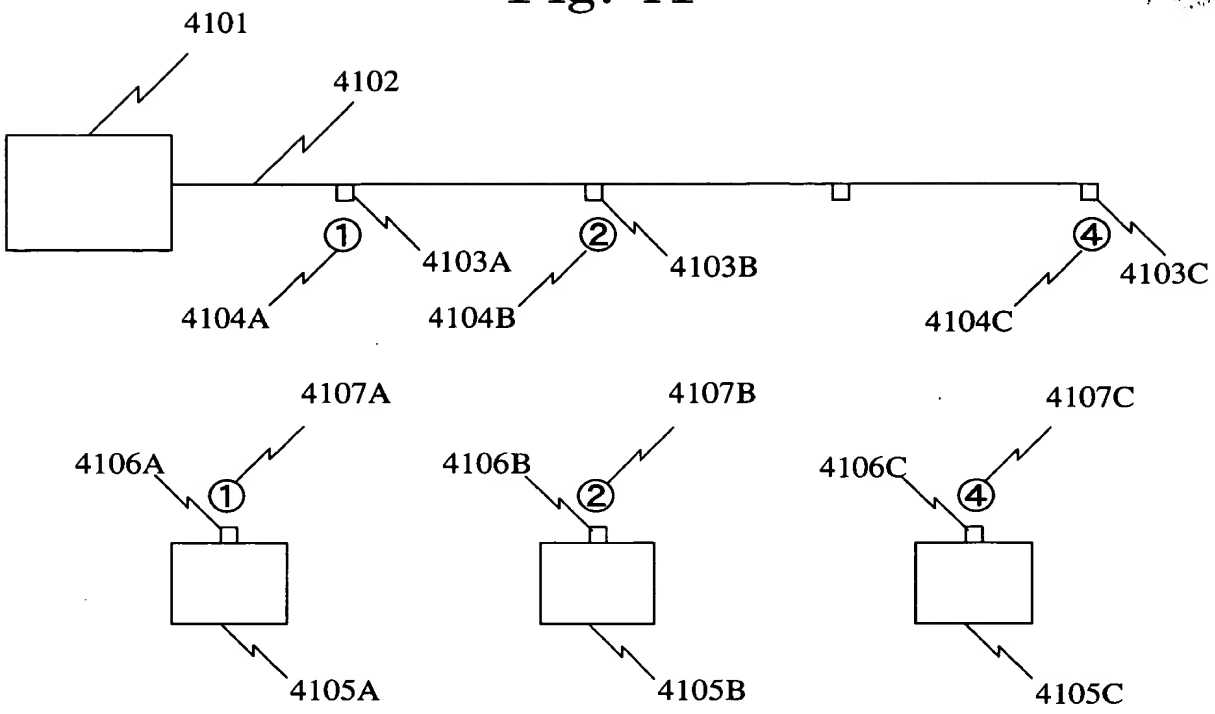

4101
4102
①
②
④
4103A
4103B
4103C
4104A
4104B
4104C
4107A
4107B
4107C
4106A
4106B
4106C
4105A
4105B
4105C

Fig. 42

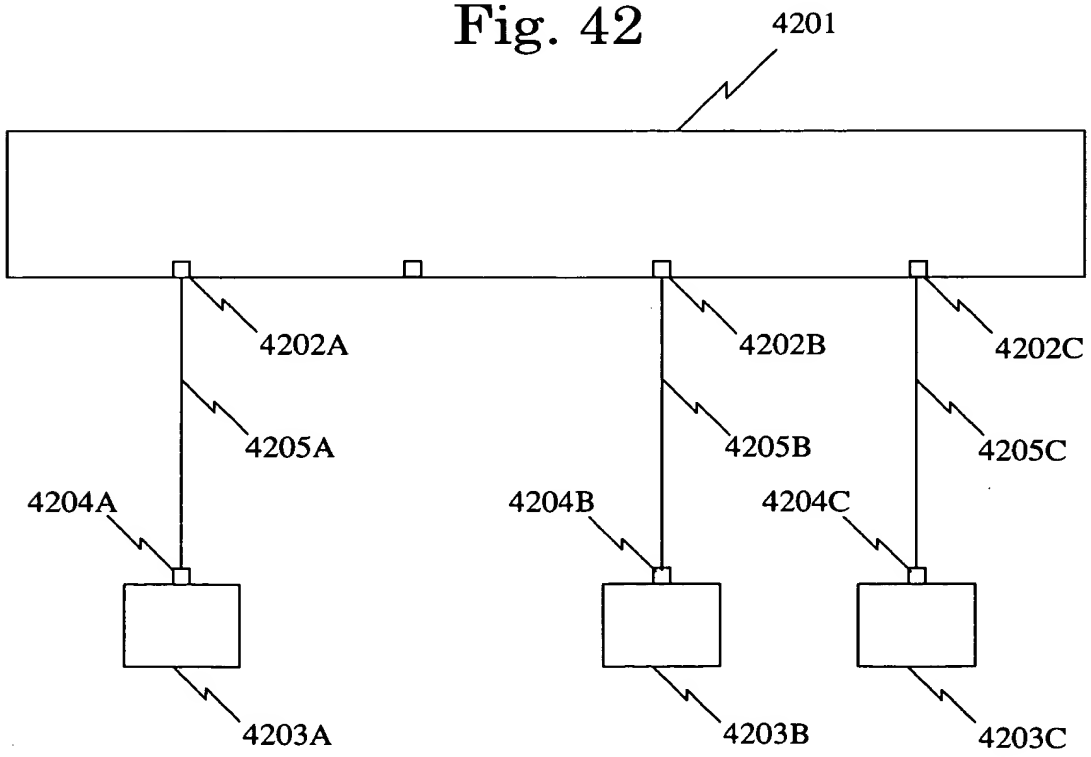

4201
4202A
4202B
4202C
4205A
4205B
4205C
4204A
4204B
4204C
4203A
4203B
4203C

Fig. 43

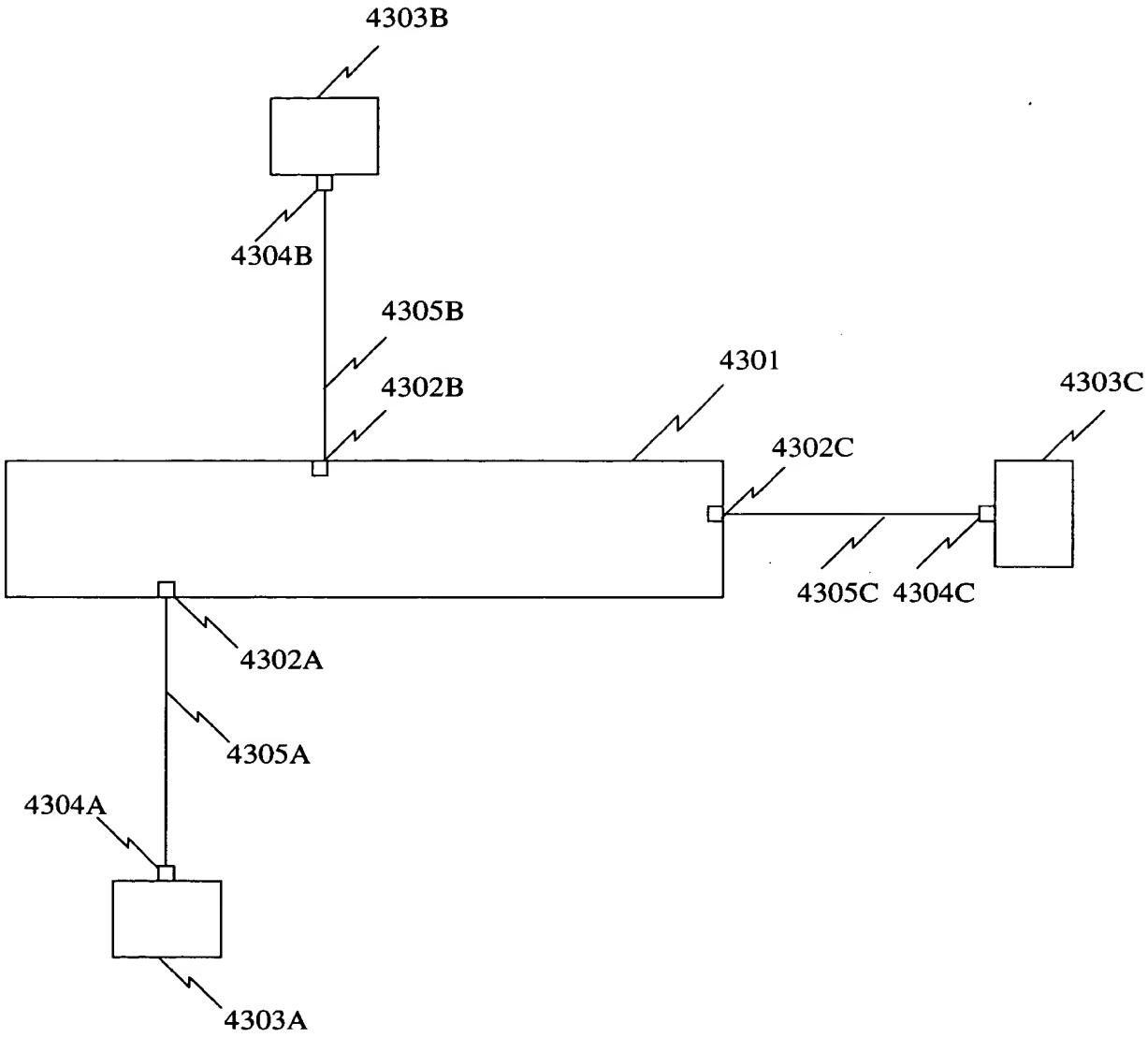

4303B
4304B
4305B
4302B
4301
4303C
4302C
4305C
4304C
4302A
4305A
4304A
4303A

Fig. 44

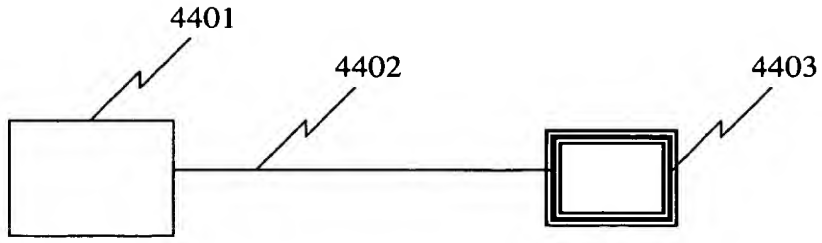


Fig. 45

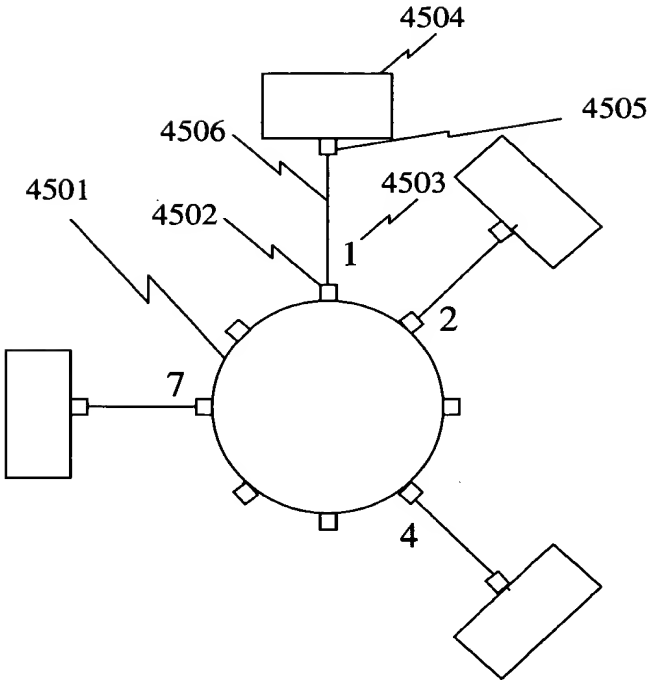


Fig. 46 (a)

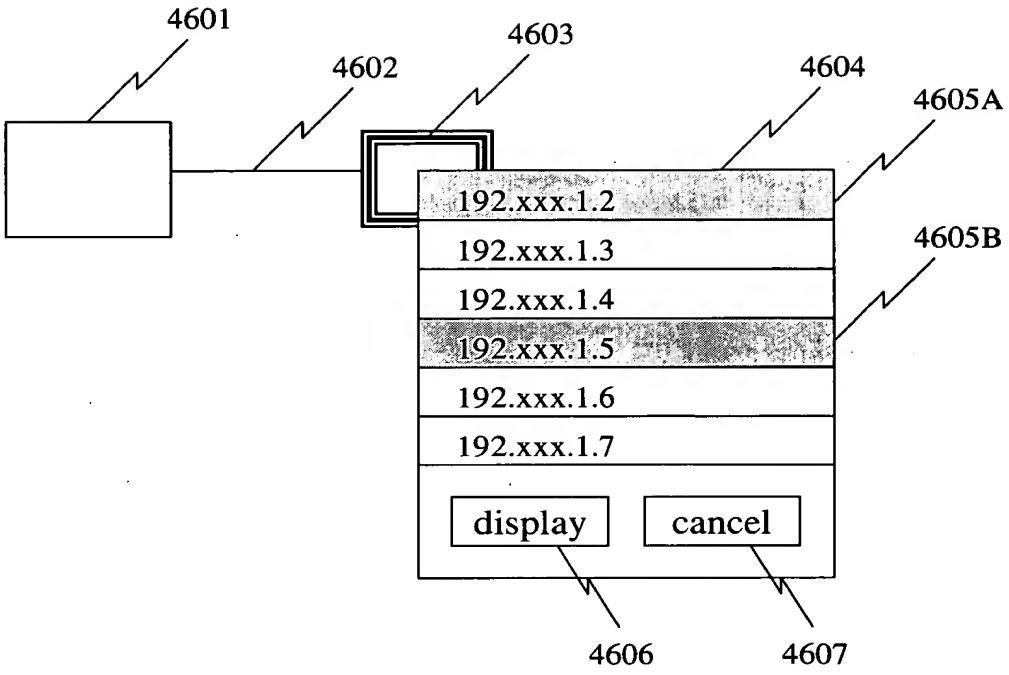


Fig. 46 (b)

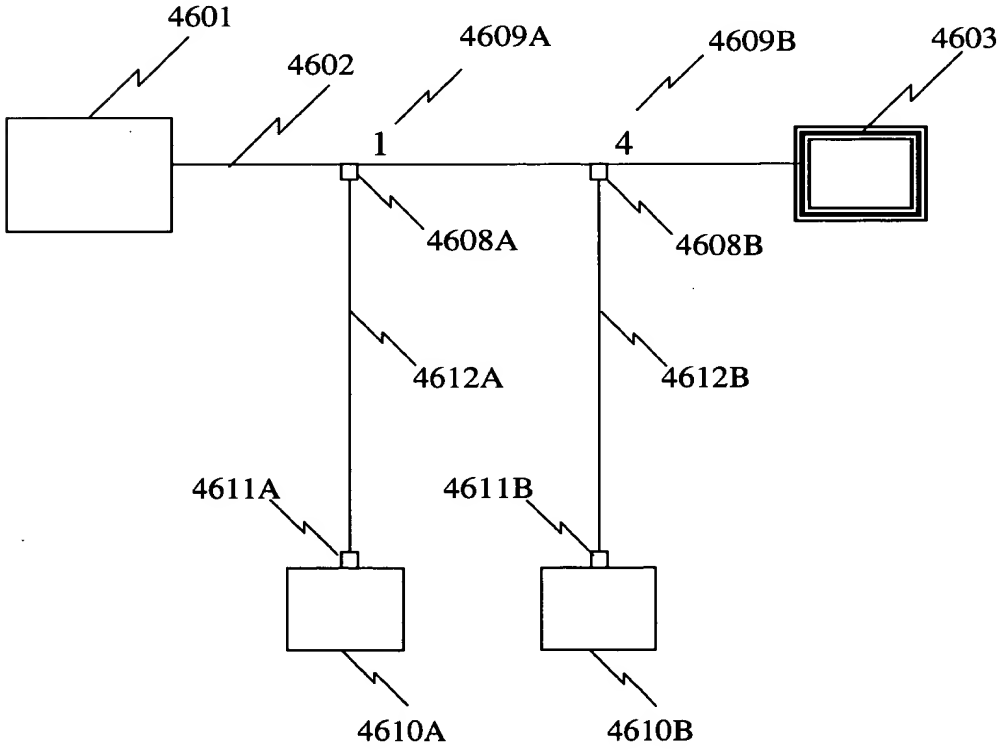


Fig. 47

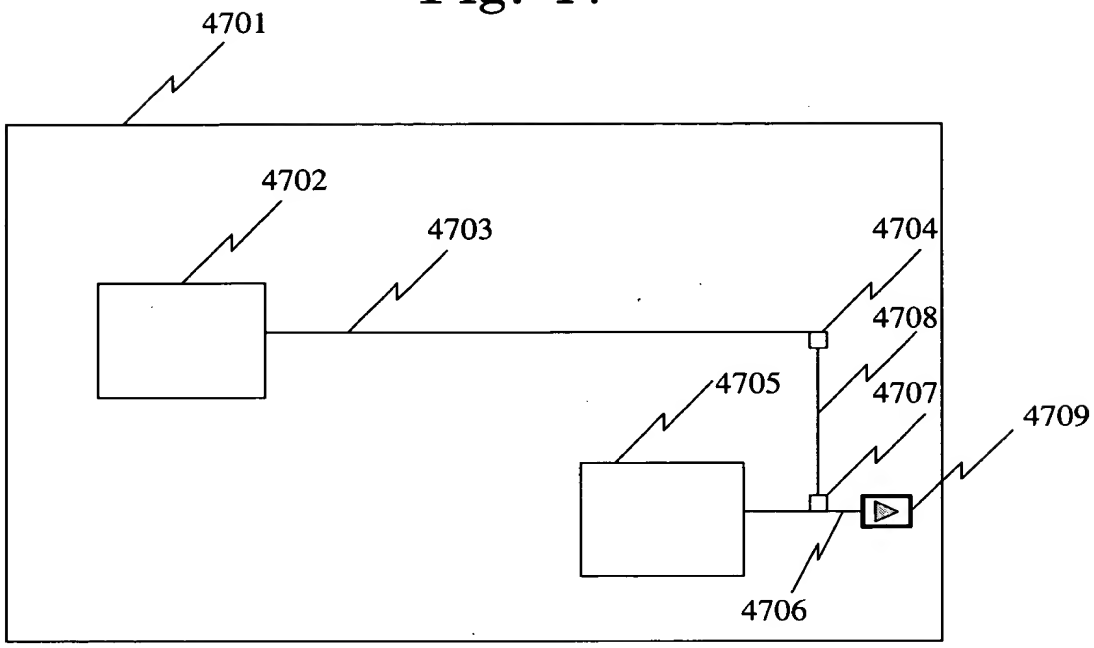


Fig. 48 (a)

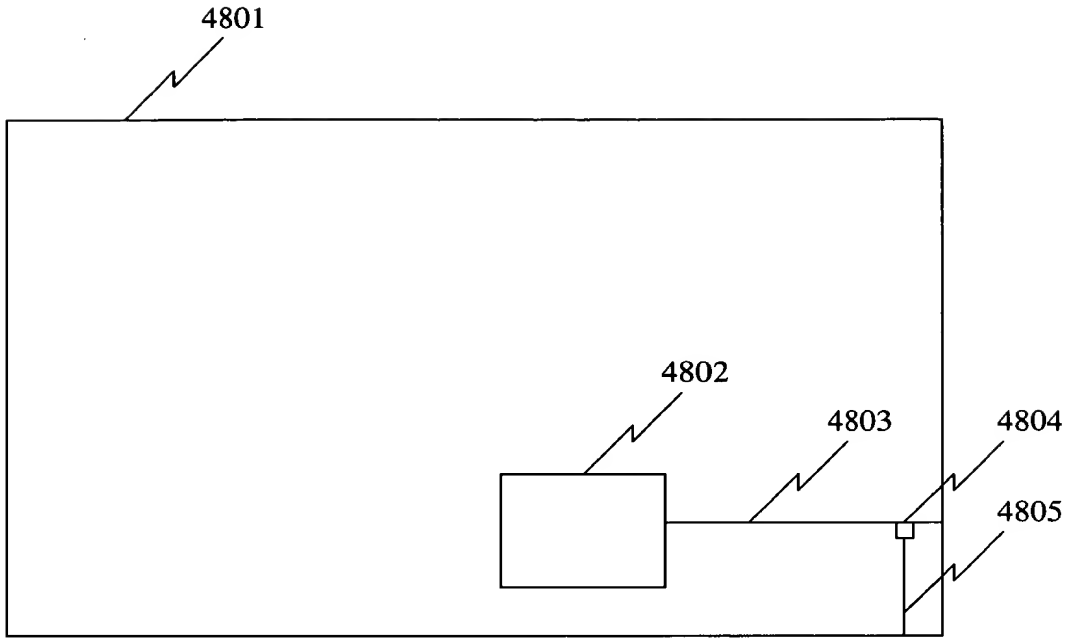


Fig. 48 (b)

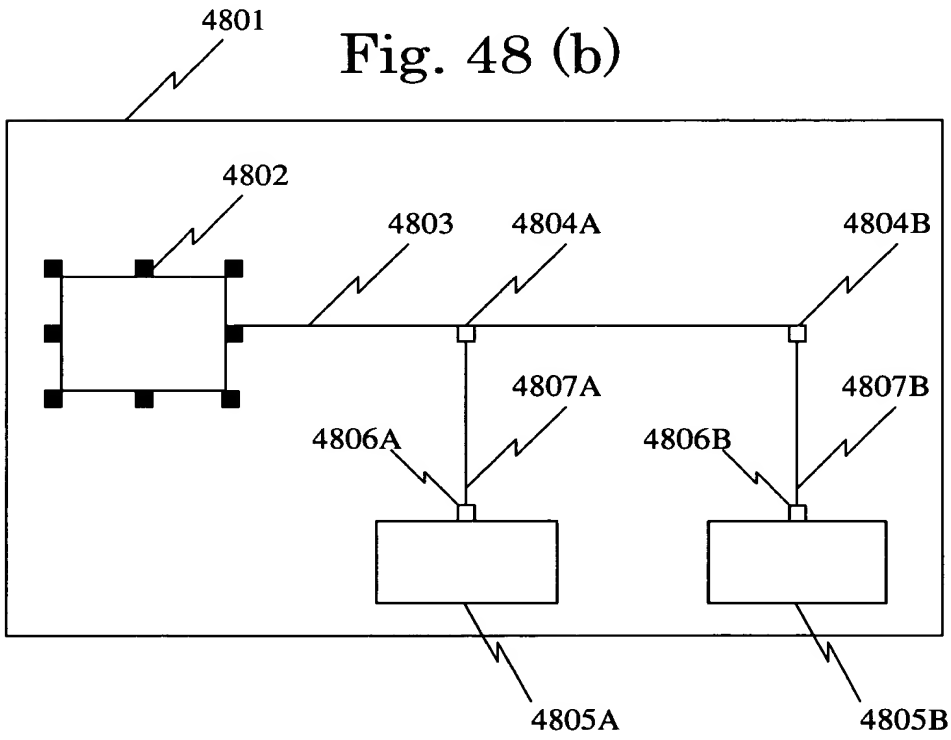


Fig. 49 (a)

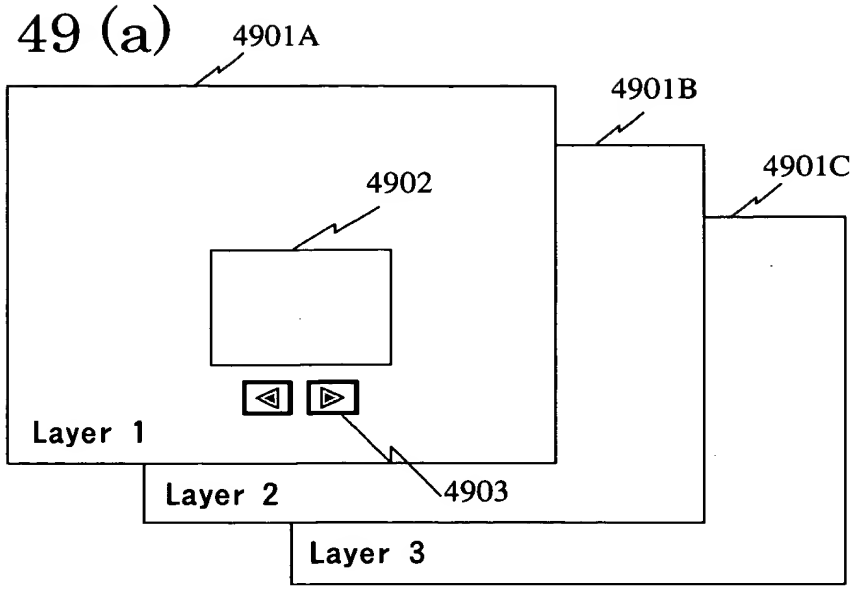


Fig. 49 (b)

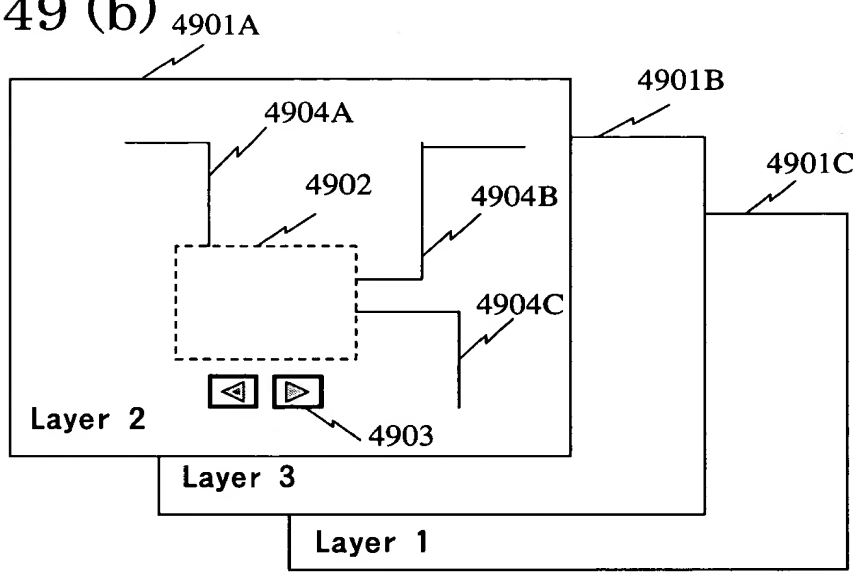


Fig. 49 (c)

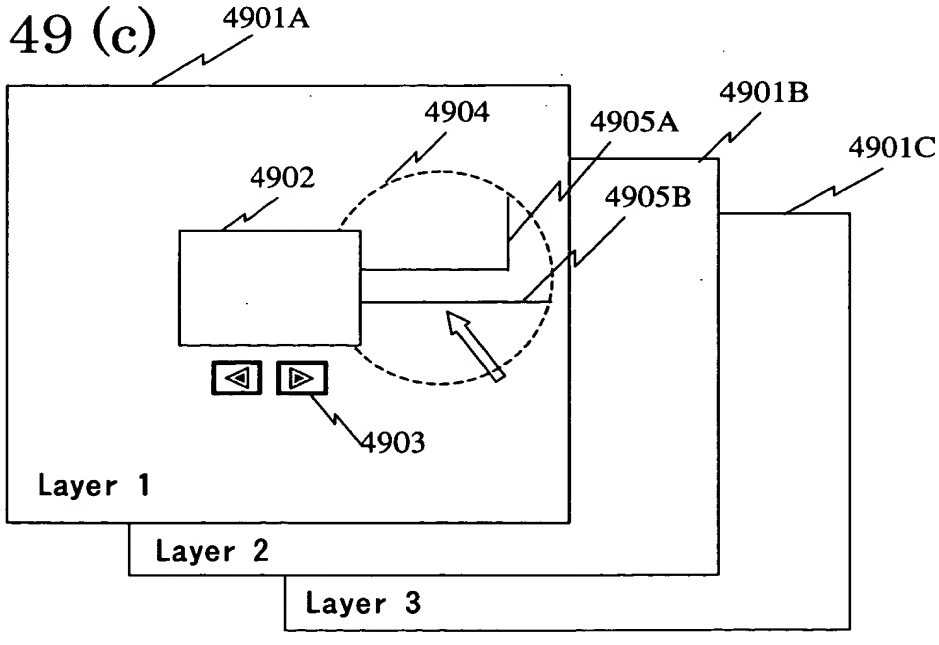


Fig. 50

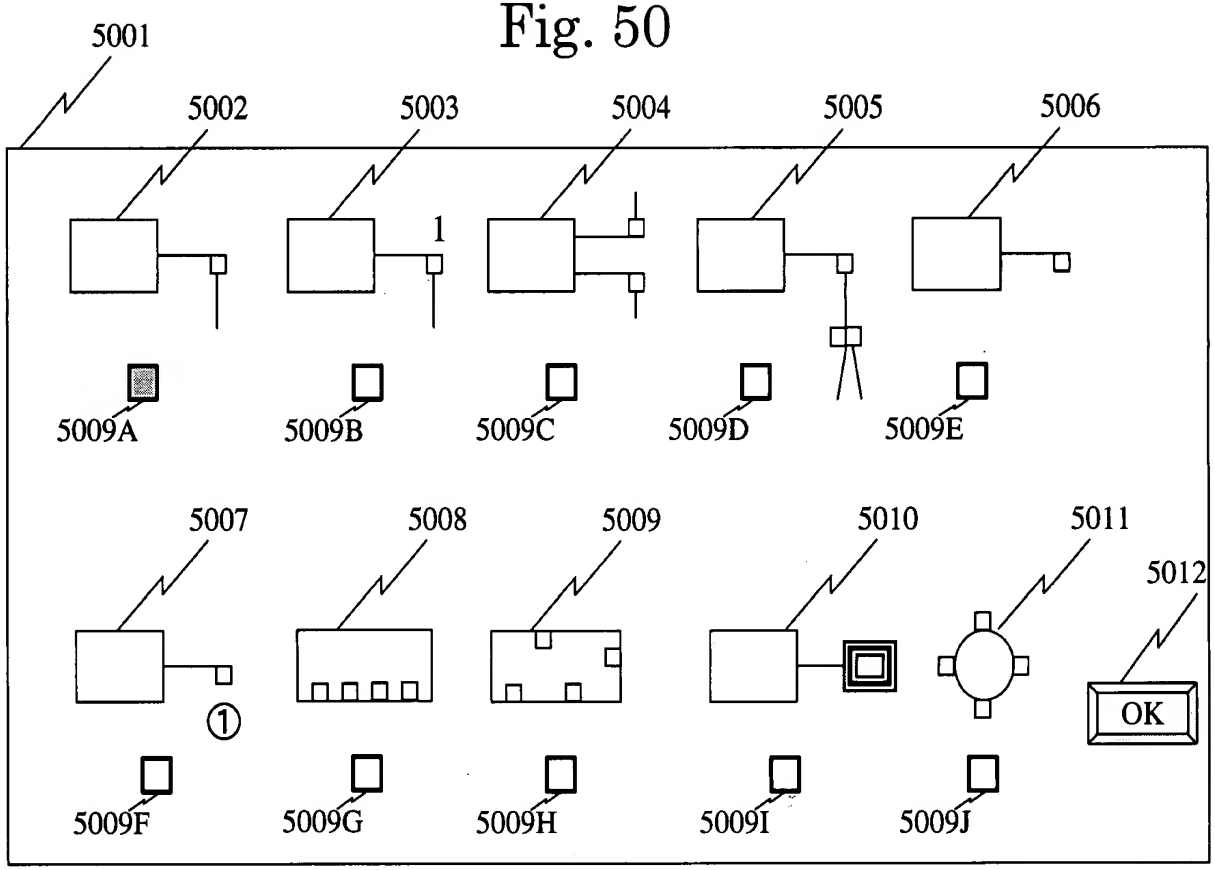


Fig. 51

Operation Flowchart for Active Status Detection Module
(Active Status Detection Process through Sending/Receiving of ICMP Echo Requests)

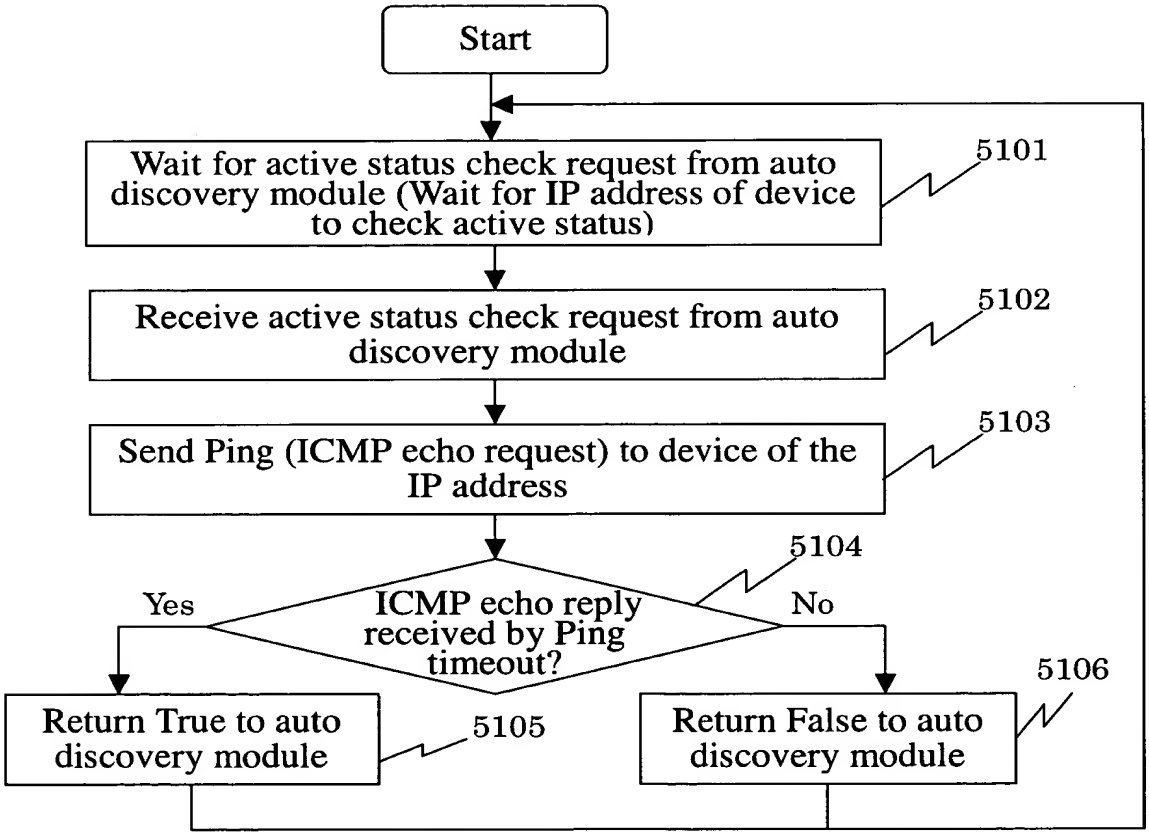


Fig. 52

Operation Flowchart for MIB Access Module (Process of Creating PDUs (Protocol Data Units) and Sending/Receiving SNMP Messages)

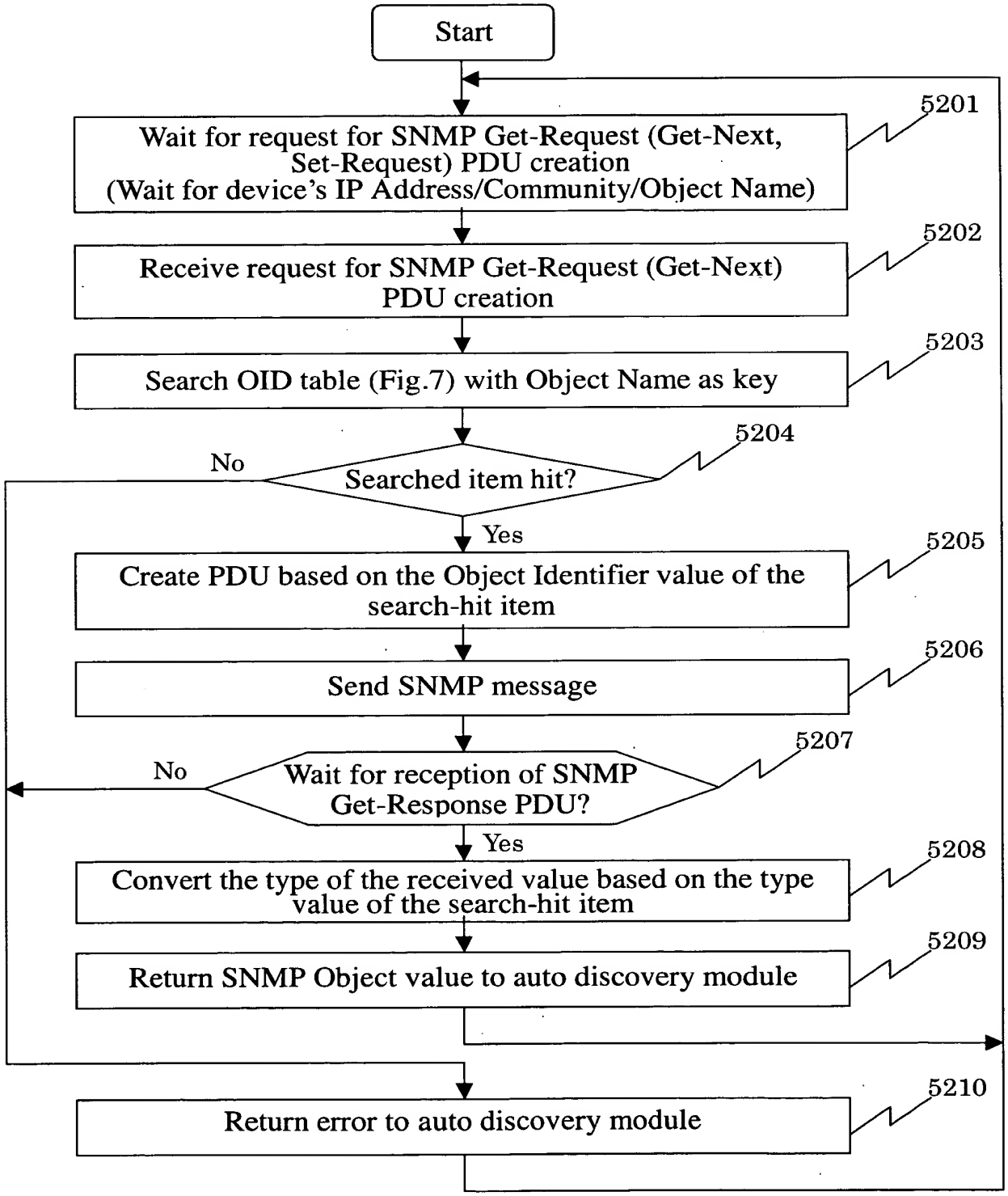


Fig. 53

Operation Flowchart 1 for Auto Discovery Module
(Process for AT Table Creation)

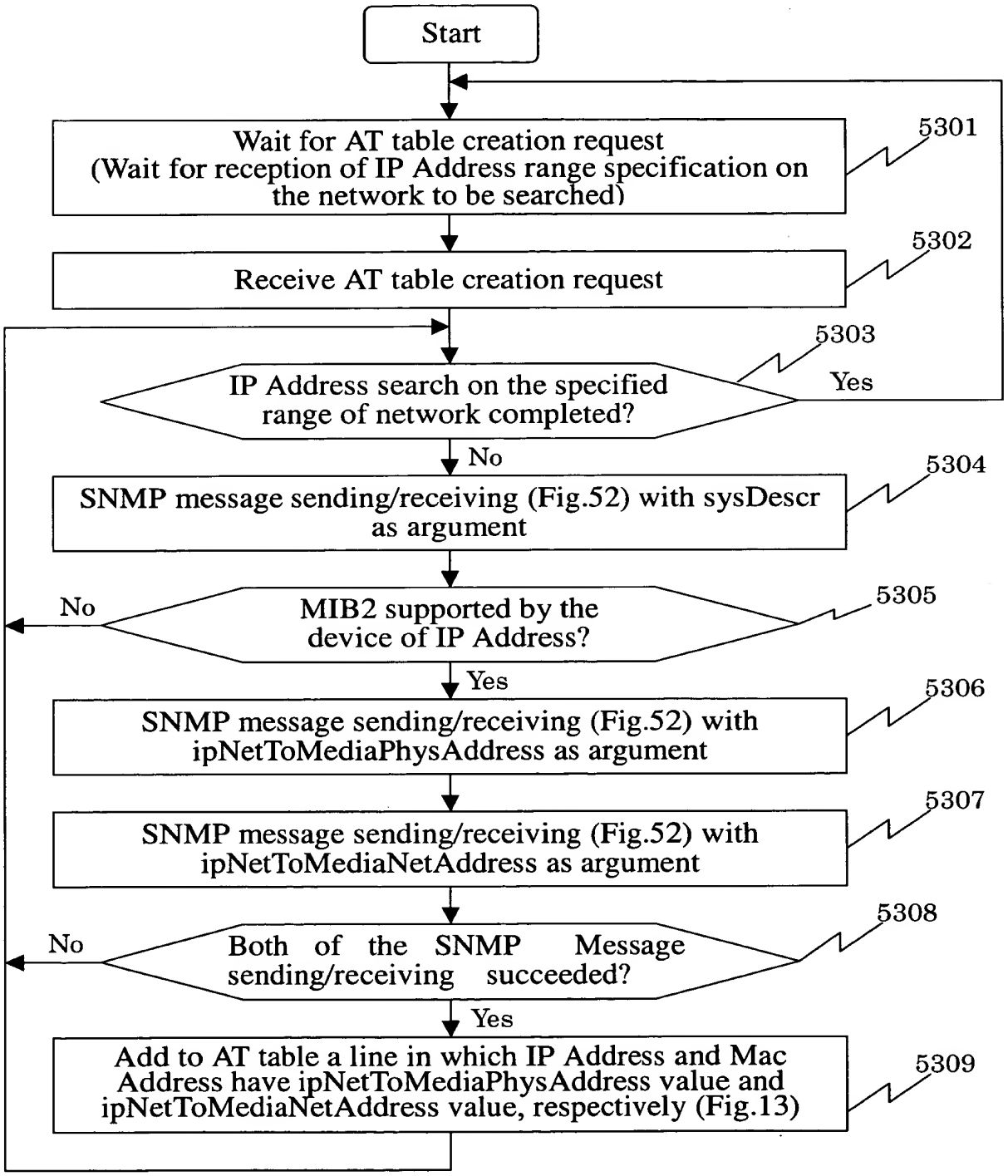


Fig. 54

Operation Flowchart 2 for Auto Discovery Module
(Process for TI Table Creation)

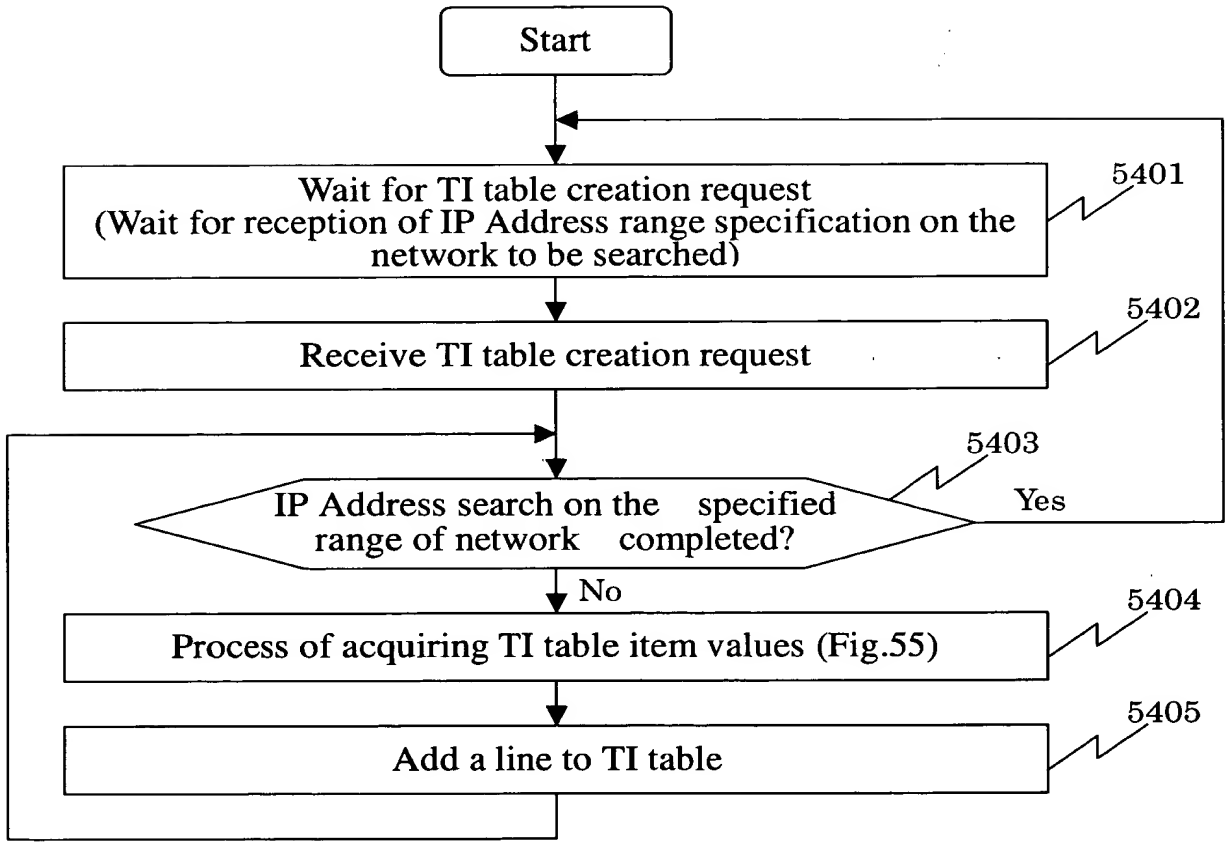


Fig. 55

Operation Flowchart 3 for Auto Discovery Module
(TI Table Creation (Process of Acquiring TI Table Item Values))

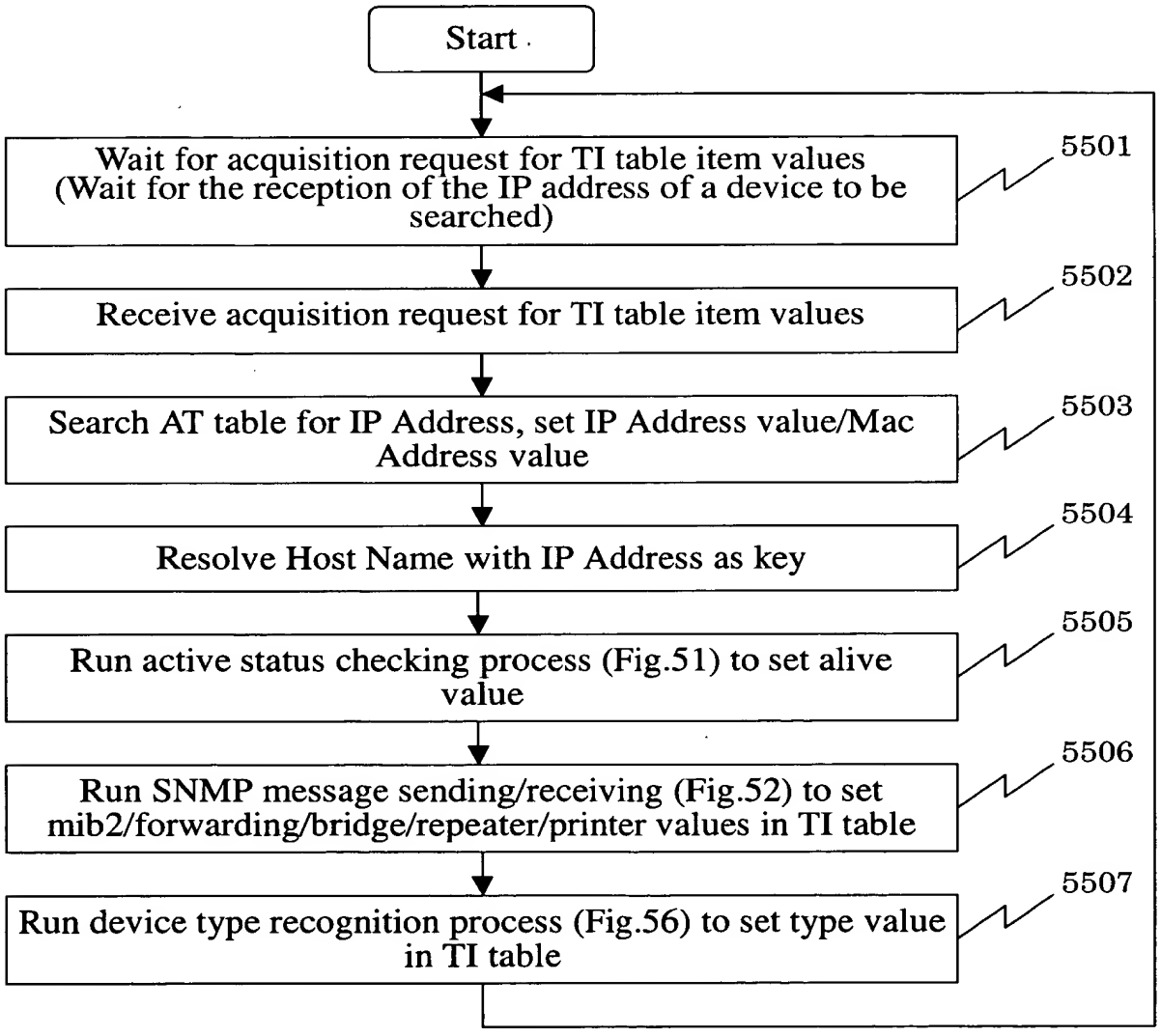


Fig. 56

Operation Flowchart 4 for Auto Discovery Module(Process of Acquiring TI Table ITEM Value(Device Type Recognition Process (Fig.13)))

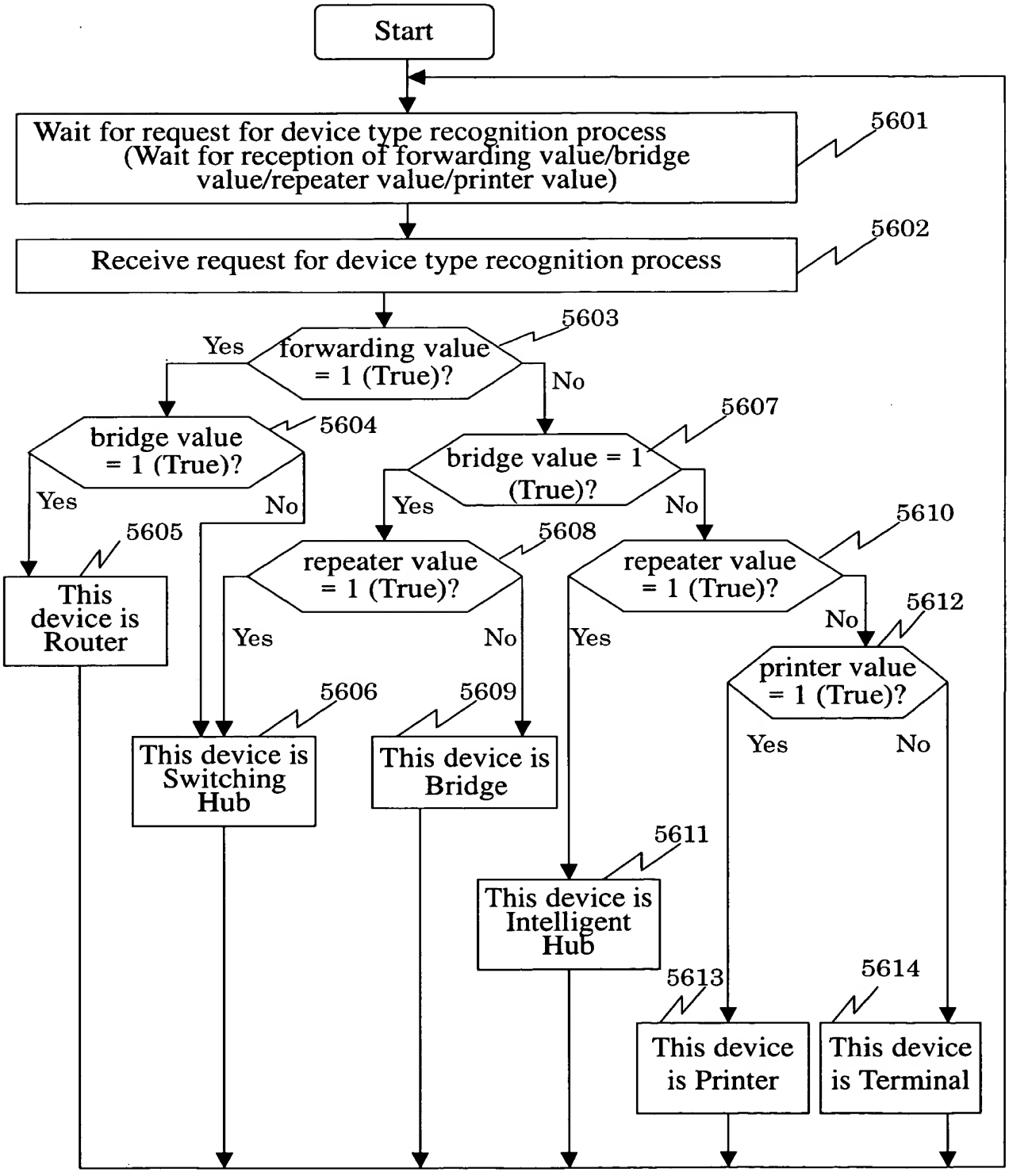


Fig. 57

Operation Flowchart 5 for Auto Discovery Module
(Process for PF Table Creation)

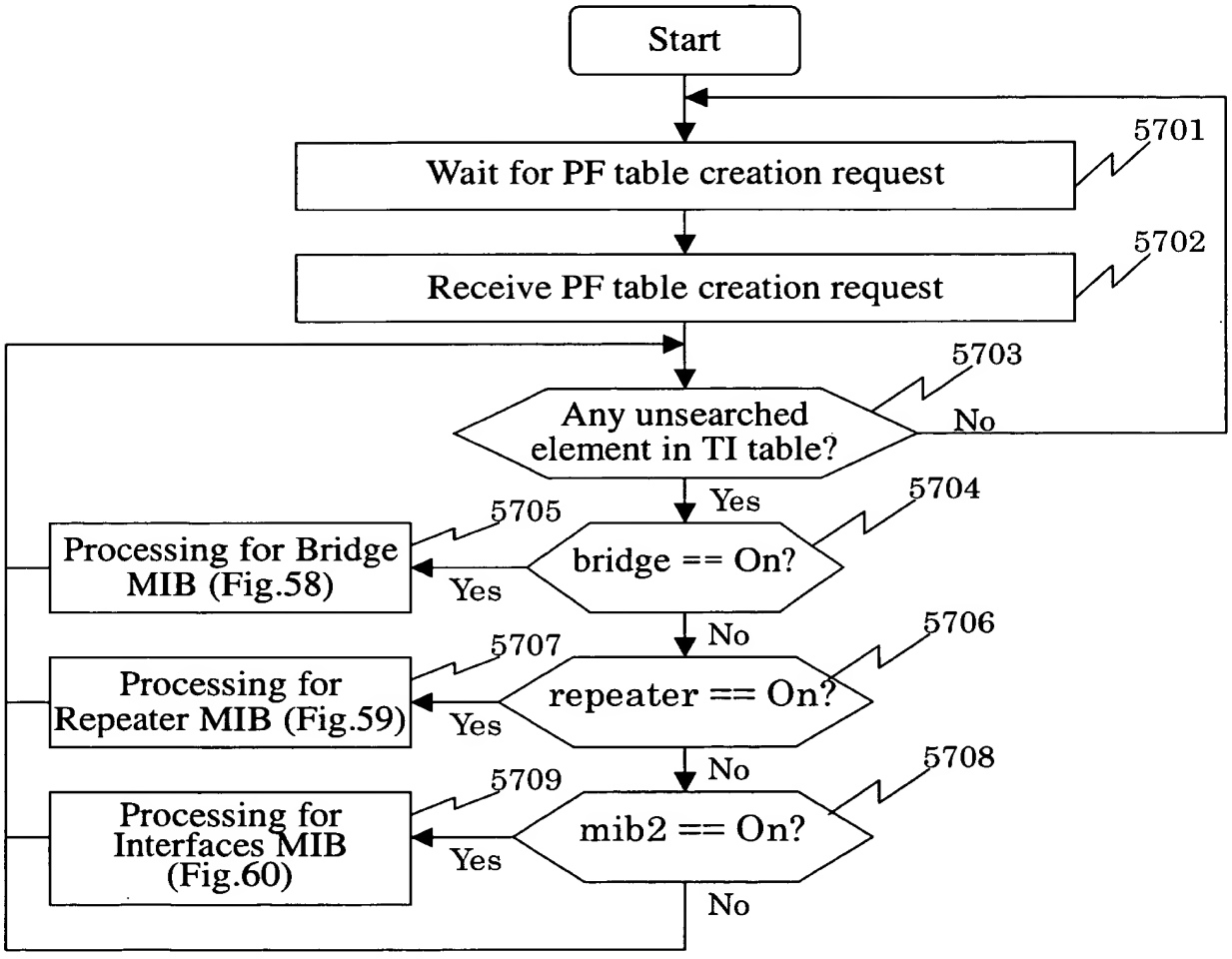


Fig. 58

Operation Flowchart 6 for Auto Discovery Module
(PF Table Creation (Processing for Bridge MIB))

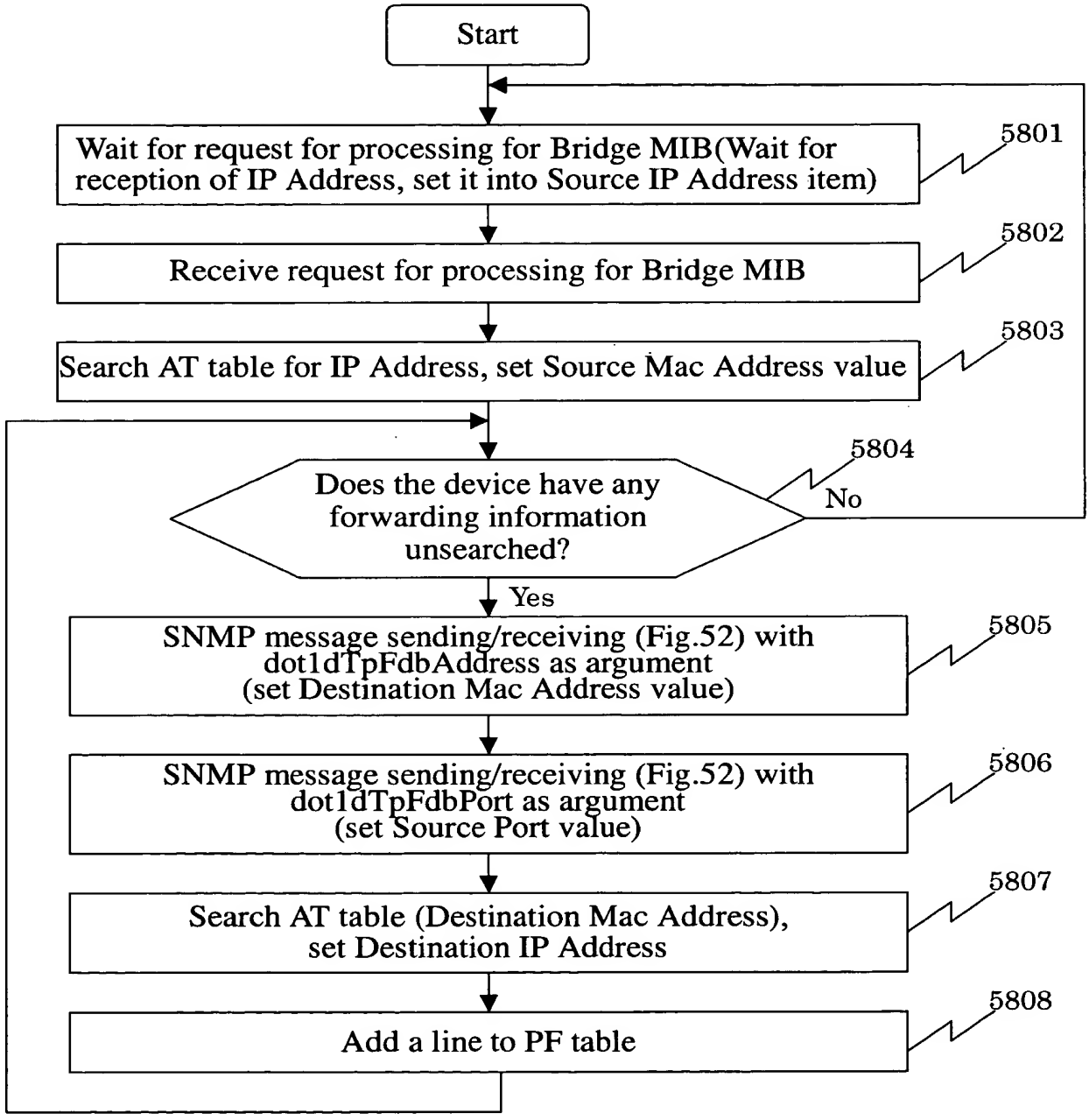


Fig. 59

Operation Flowchart 7 for Auto Discovery Module
(PF Table Creation (Processing for Repeater MIB))

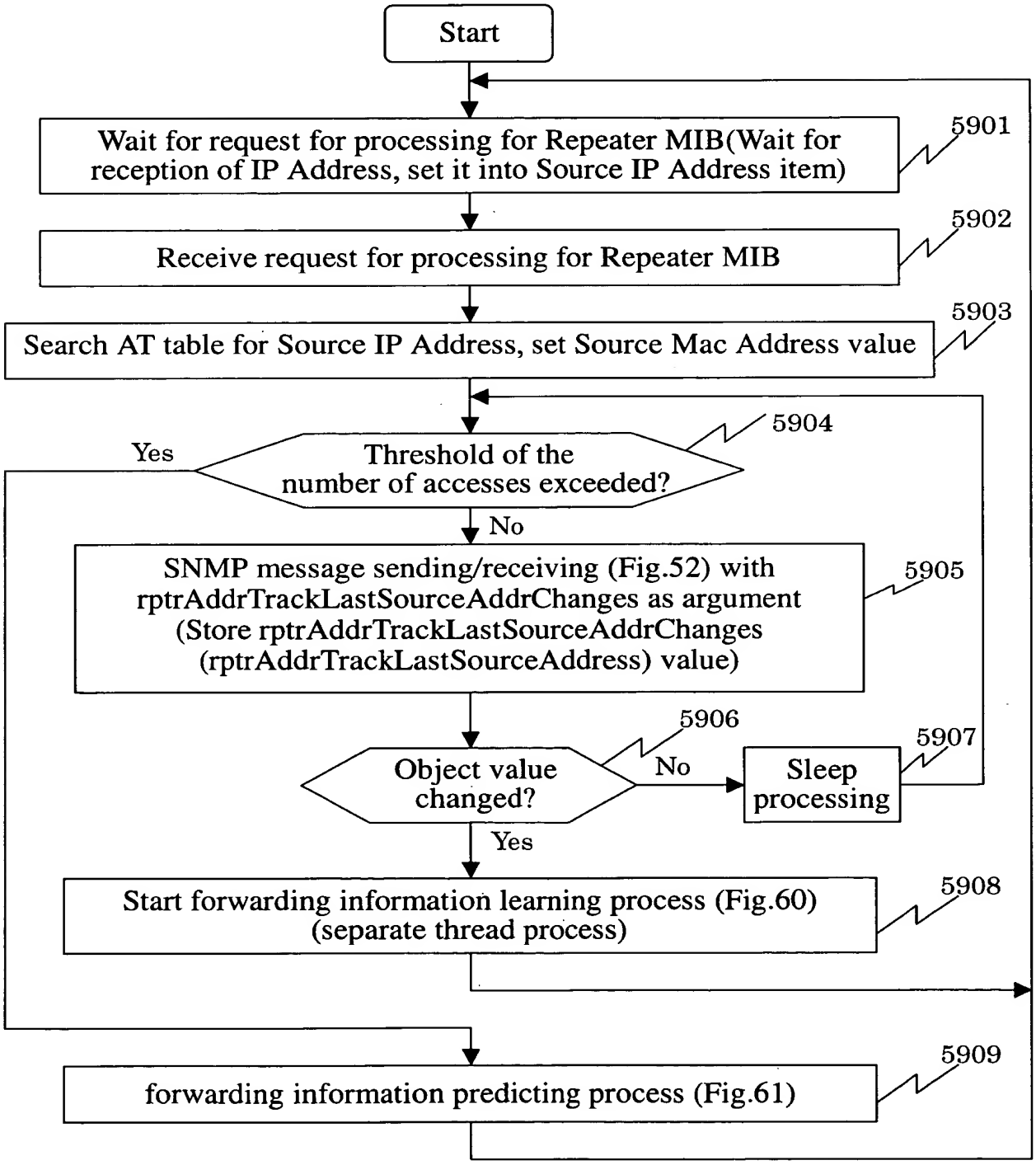


Fig. 60

Operation Flowchart 8 for Auto Discovery Module
(Processing for Repeater MIB (Forwarding Information Learning process))

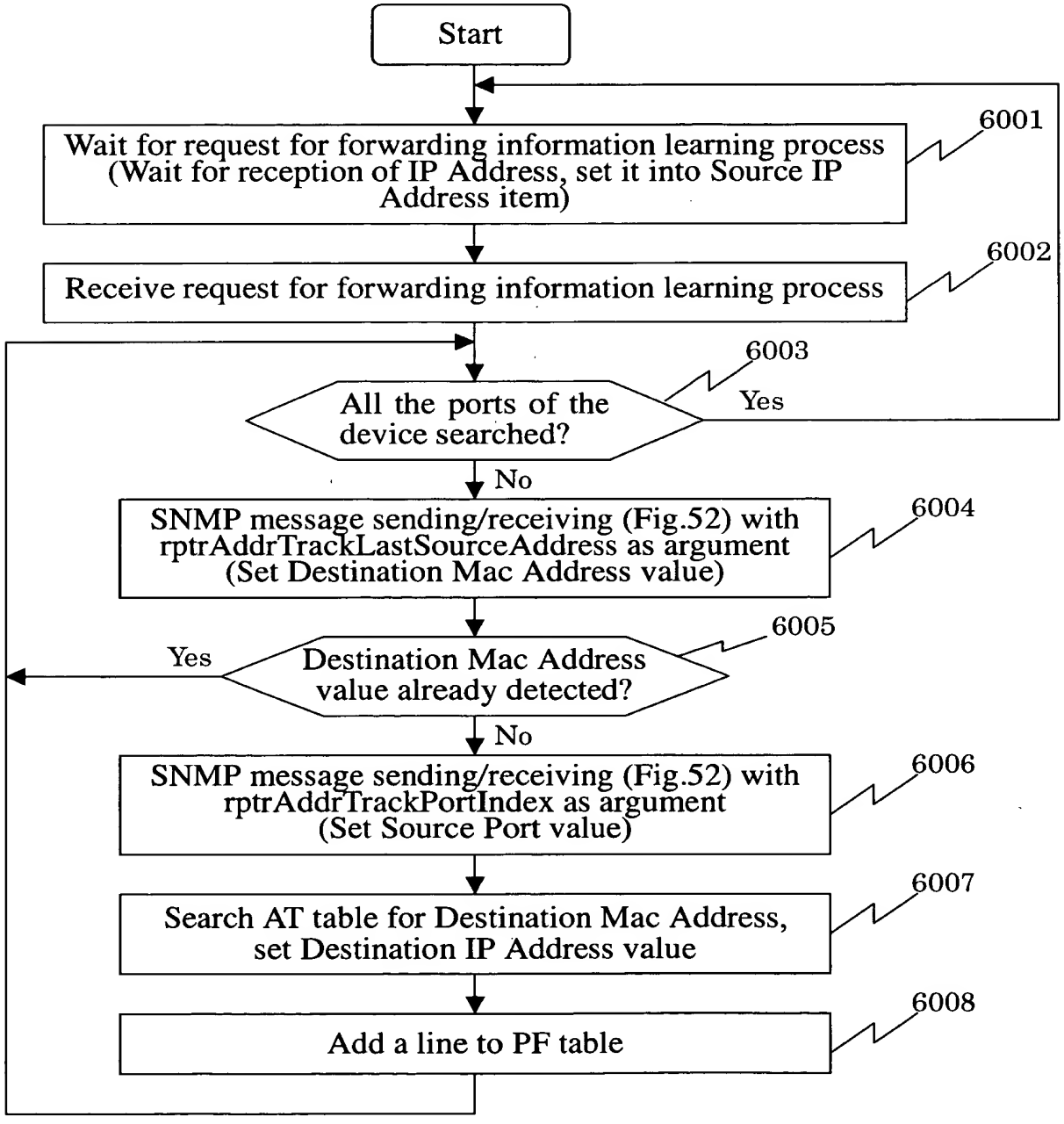


Fig. 61

Operation Flowchart 9 for Auto Discovery Module
(Processing for Repeater MIB (Forwarding Information Predicting Process))

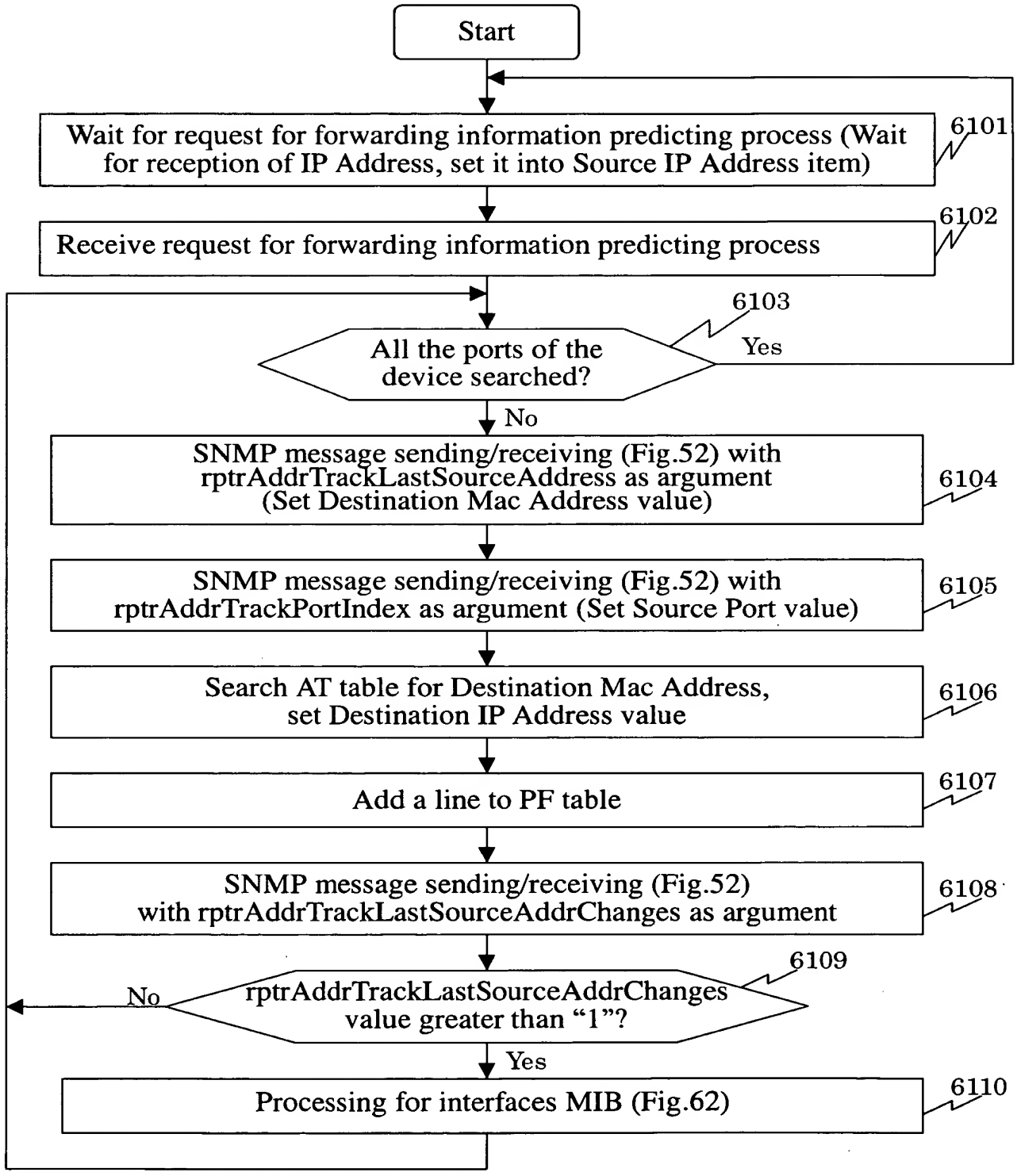


Fig. 62

Operation Flowchart 10 for Auto Discovery Module
(PF Table Creation (Processing for interfaces MIB))

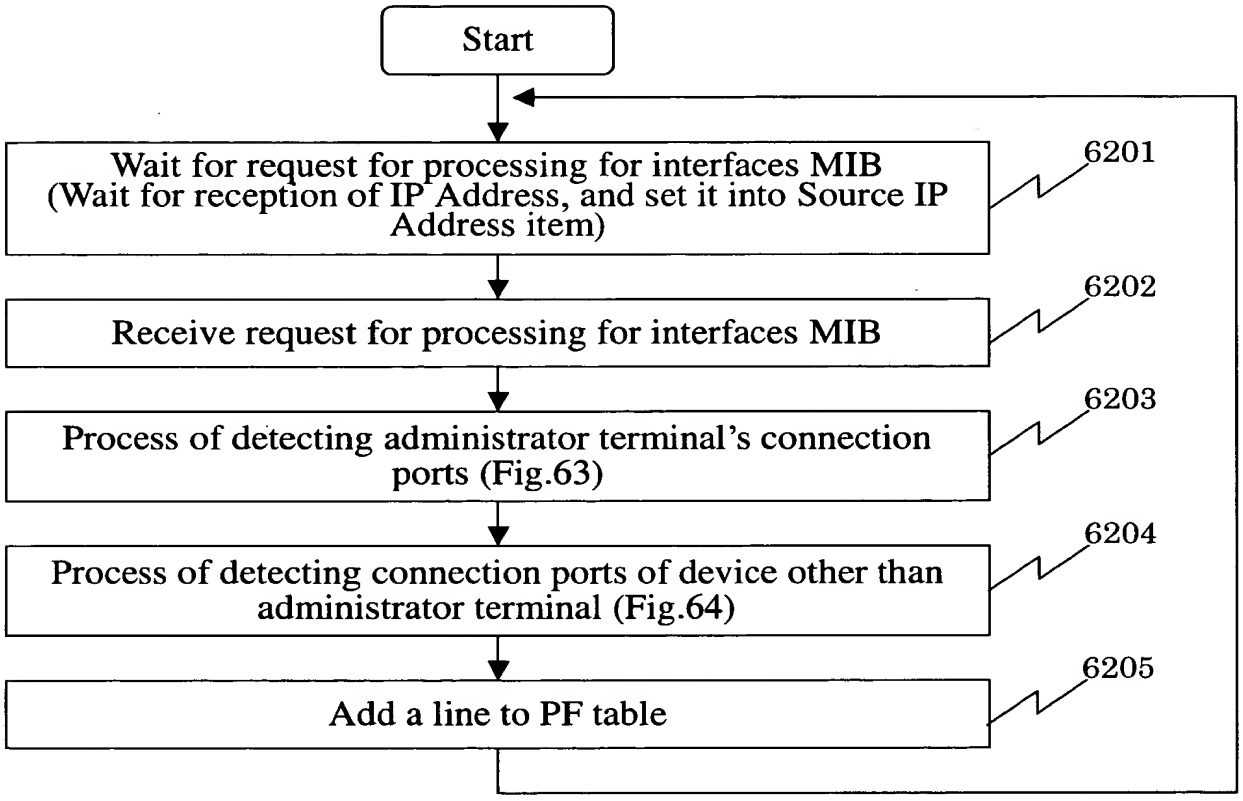


Fig. 63

Operation Flowchart 11 for Auto Discovery Module
(Processing for interfaces MIB (Process of Detecting Administrator Terminal's Connection Ports))

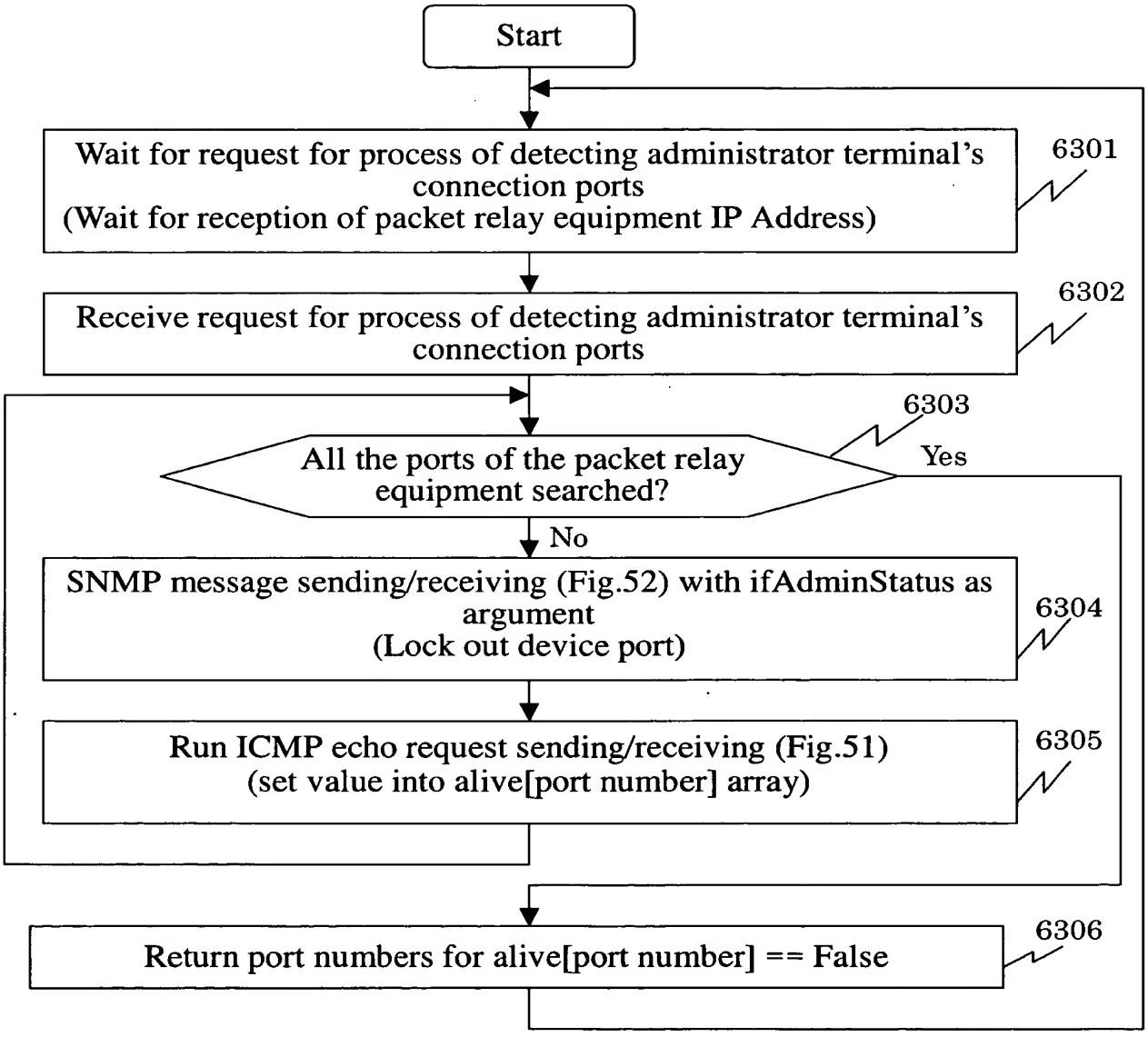


Fig. 64

Operation Flowchart 12 for Auto Discovery Module
(Processing for interfaces MIB (Process of Detecting Connection Ports of Device Other than Administrator Terminal))

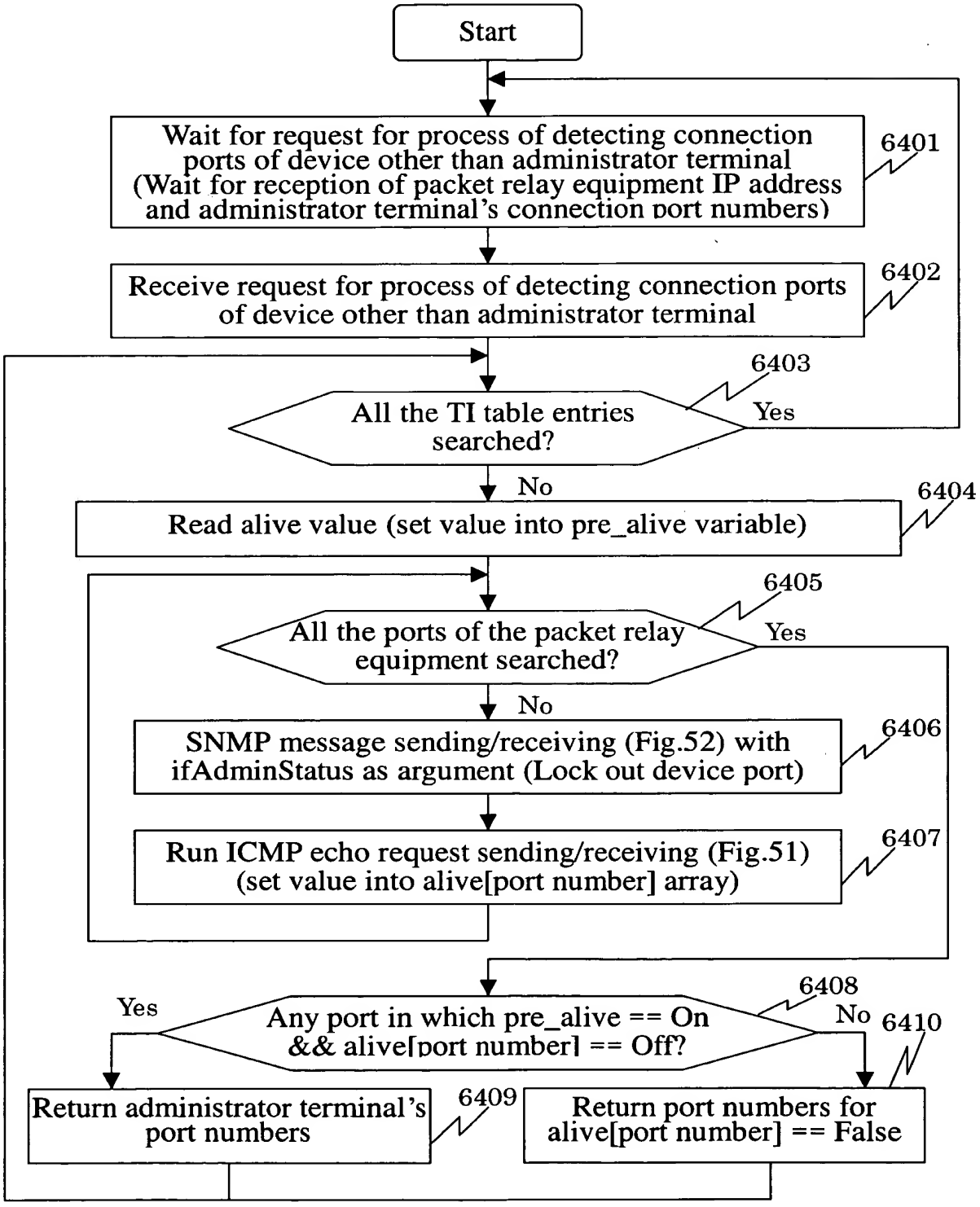


Fig. 65

Operation Flowchart 13 for Auto Discovery Module
(Process for TS Table Creation)

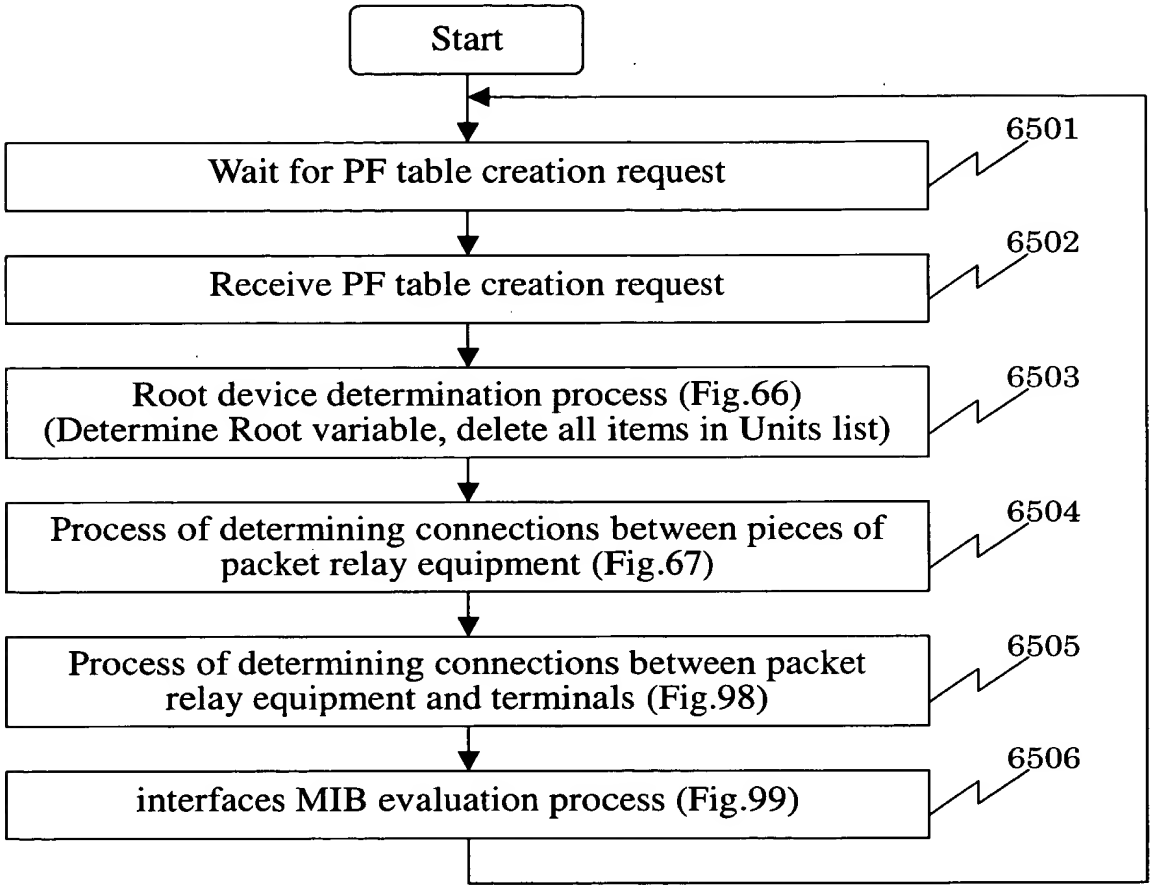


Fig. 66

Operation Flowchart 14 for Auto Discovery Module
(TS Table Creation (Root Device Determination process))

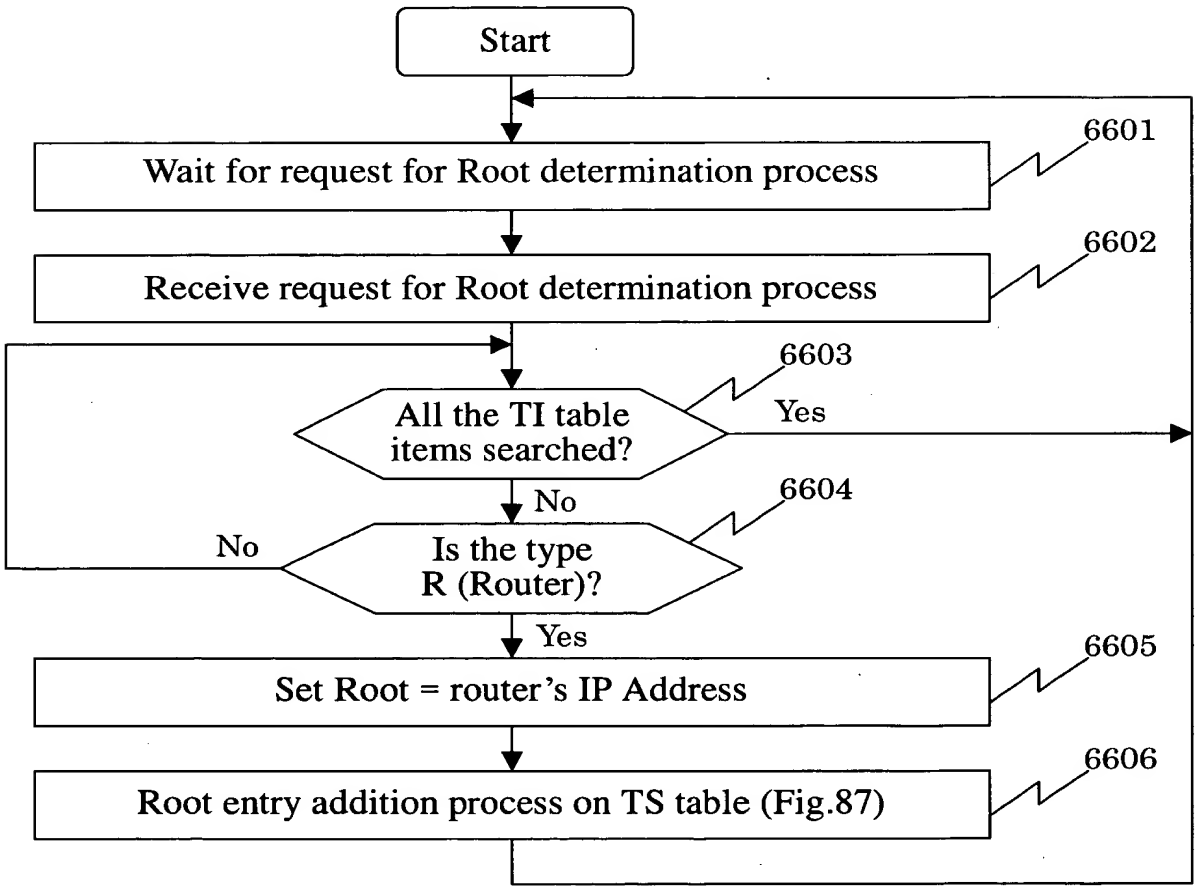


Fig. 67

Operation Flowchart 15 for Auto Discovery Module
(TS Table Creation (Process of Determining Connections between Pieces of Packet Relay Equipment))

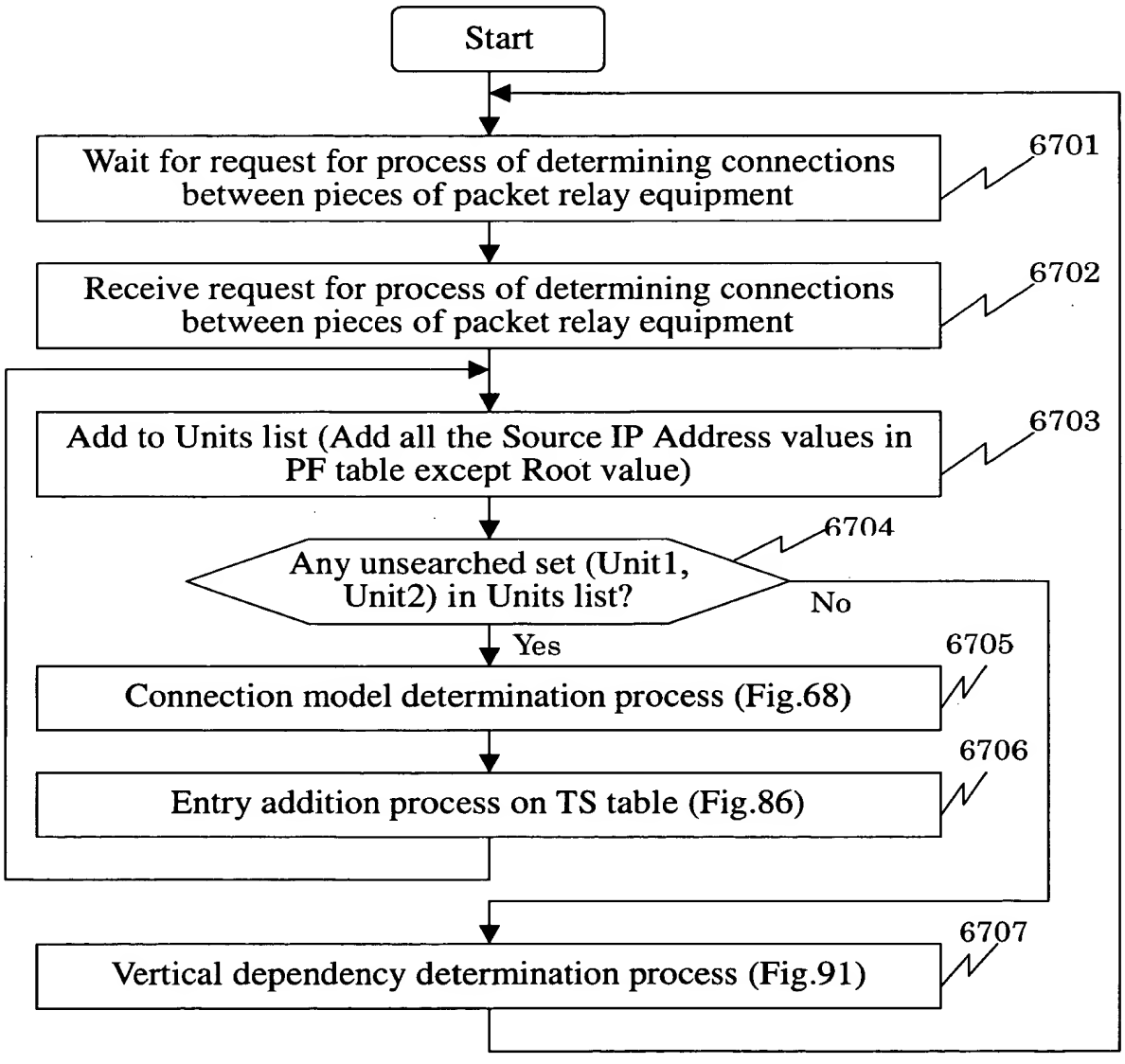


Fig. 68

Operation Flowchart 16 for Auto Discovery Module
(TS Table Creation (Connection Model Determination process)

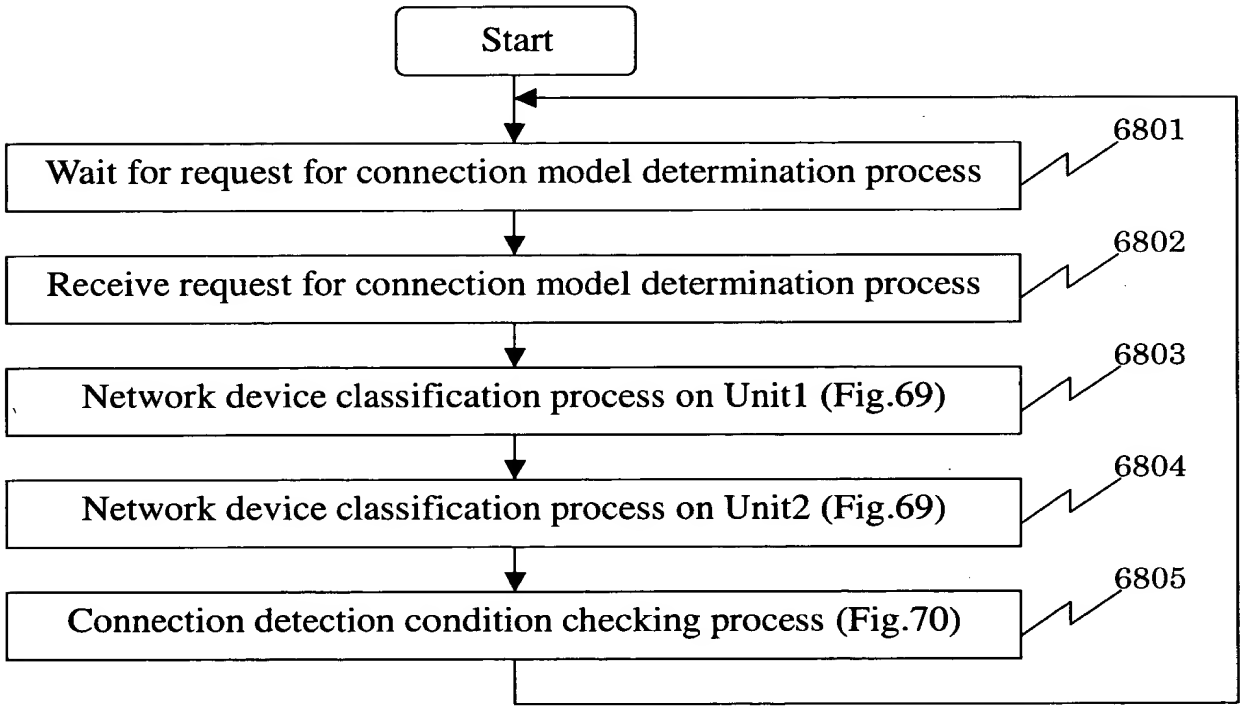


Fig. 69

Operation Flowchart 17 for Auto Discovery Module
(TS Table Creation (Network Device Classification Process)(Fig.16))

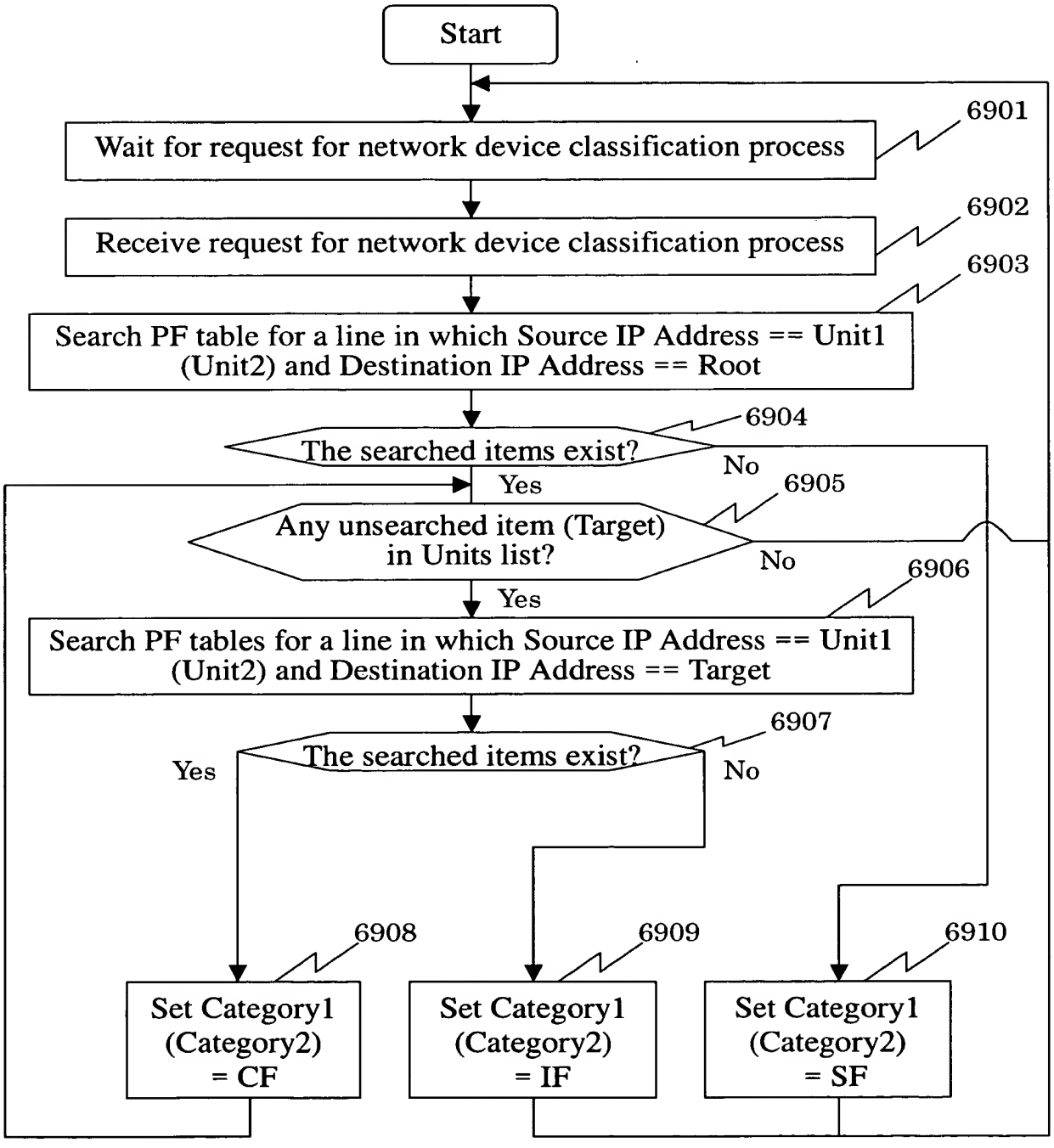


Fig. 70

Operation Flowchart 18 for Auto Discovery Module
(TS Table Creation (Connection Detection Condition Checking Process)
(Fig.25))

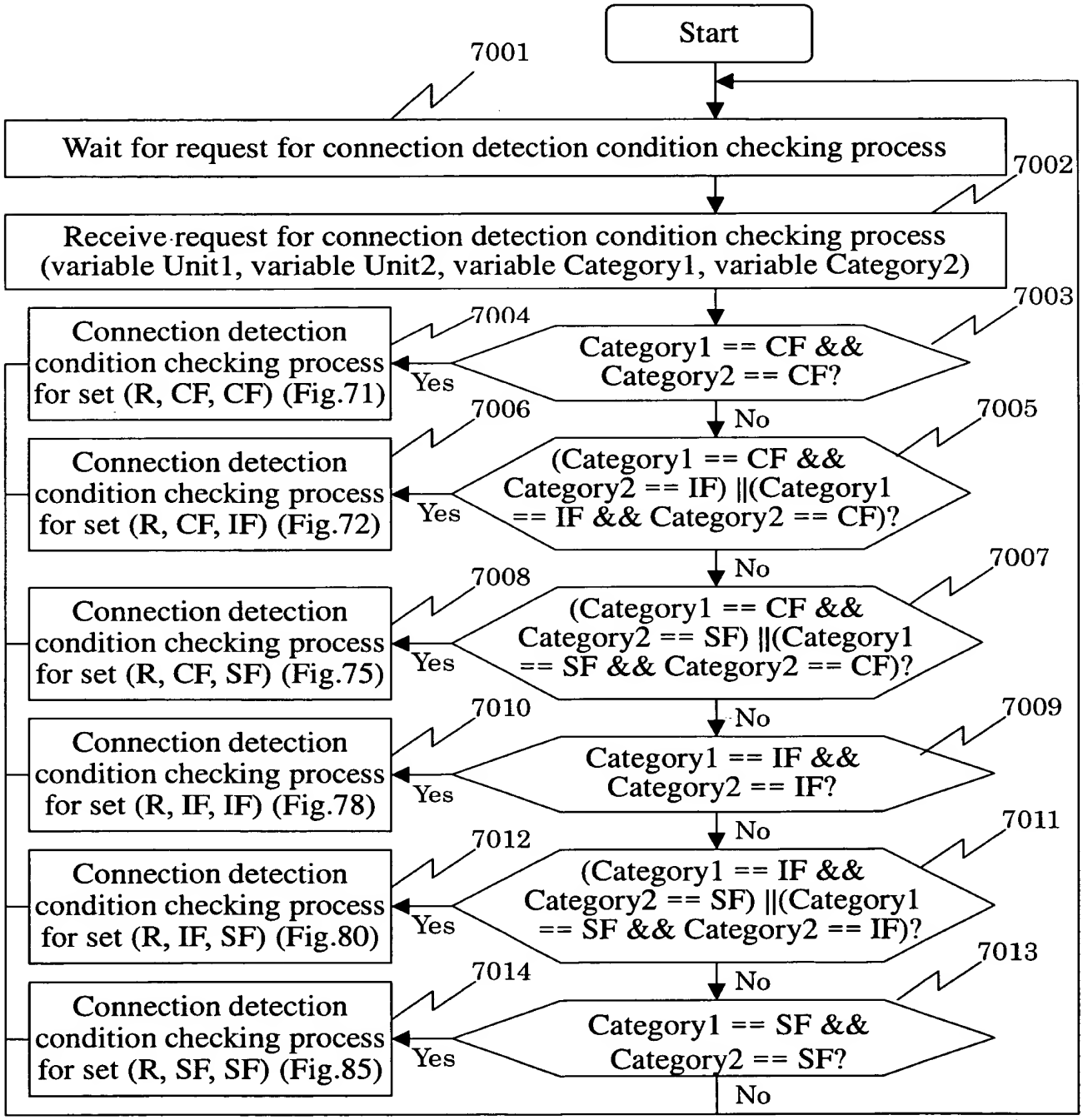


Fig. 71

Operation Flowchart 19 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for Set (R, CF, CF)) (Fig.25))

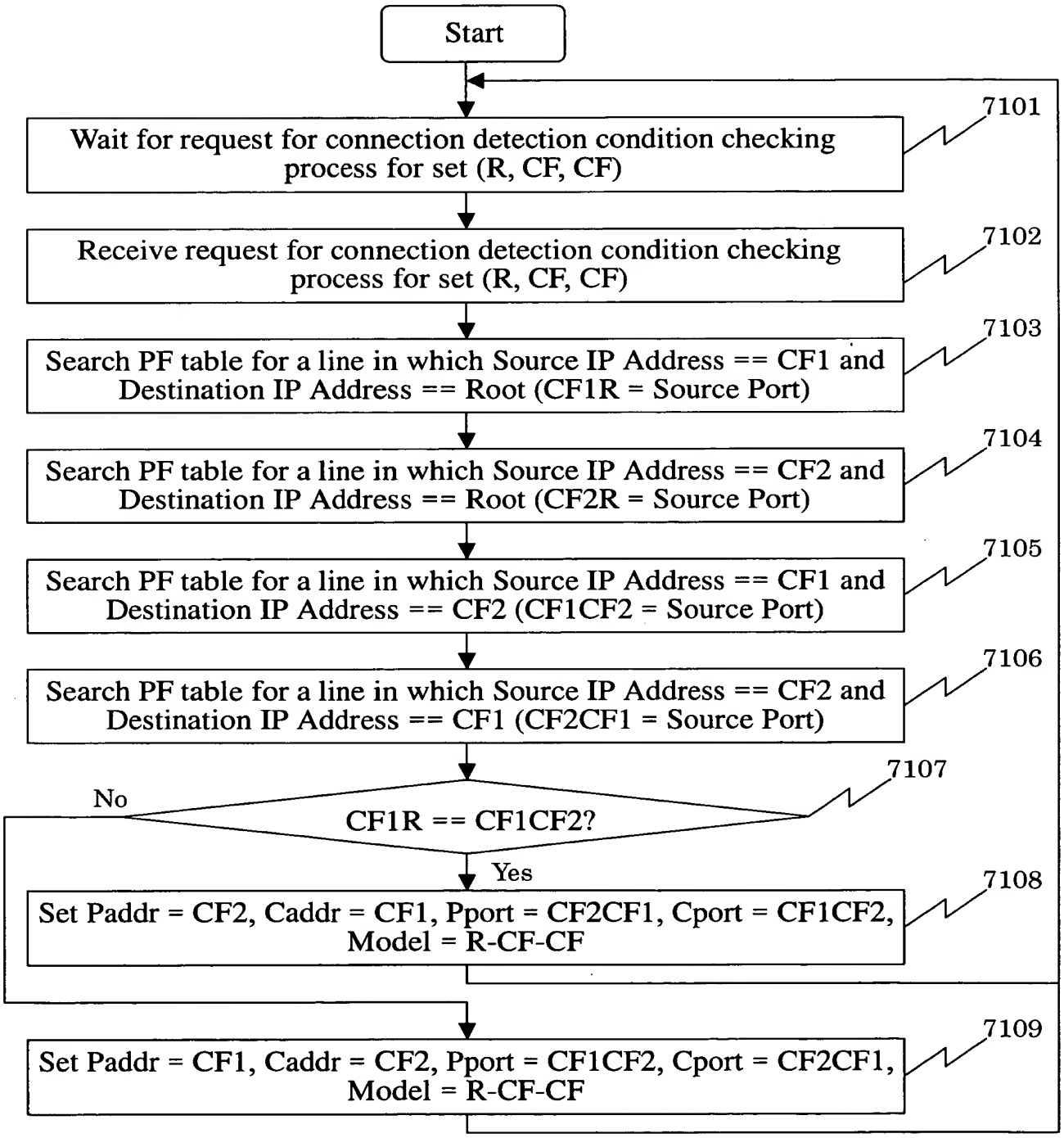


Fig. 72

Operation Flowchart 20 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for Set (R, CF, IF)) (Fig.25))

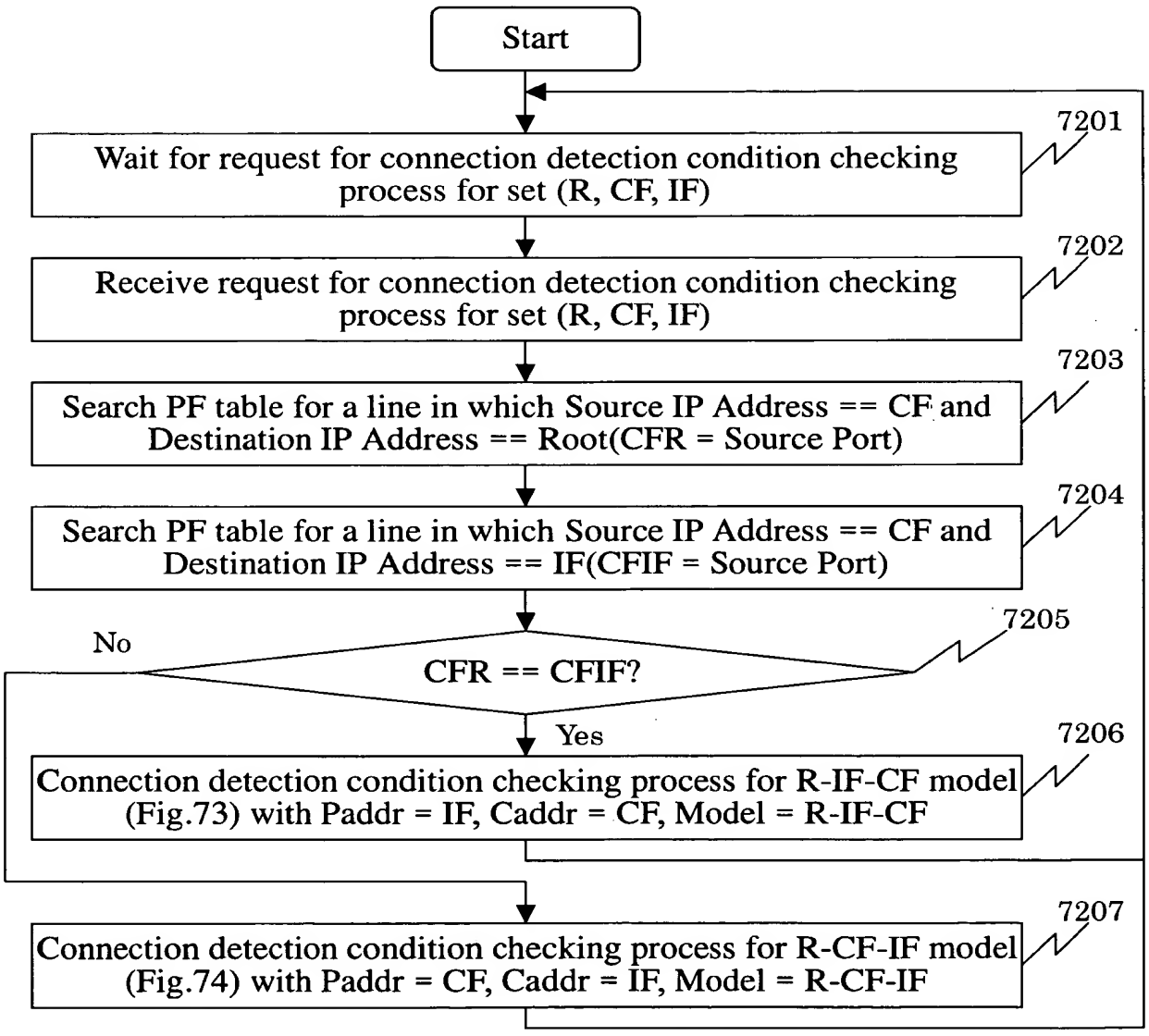


Fig. 73

Operation Flowchart 21 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for R-IF-CF Model) (Fig.25))

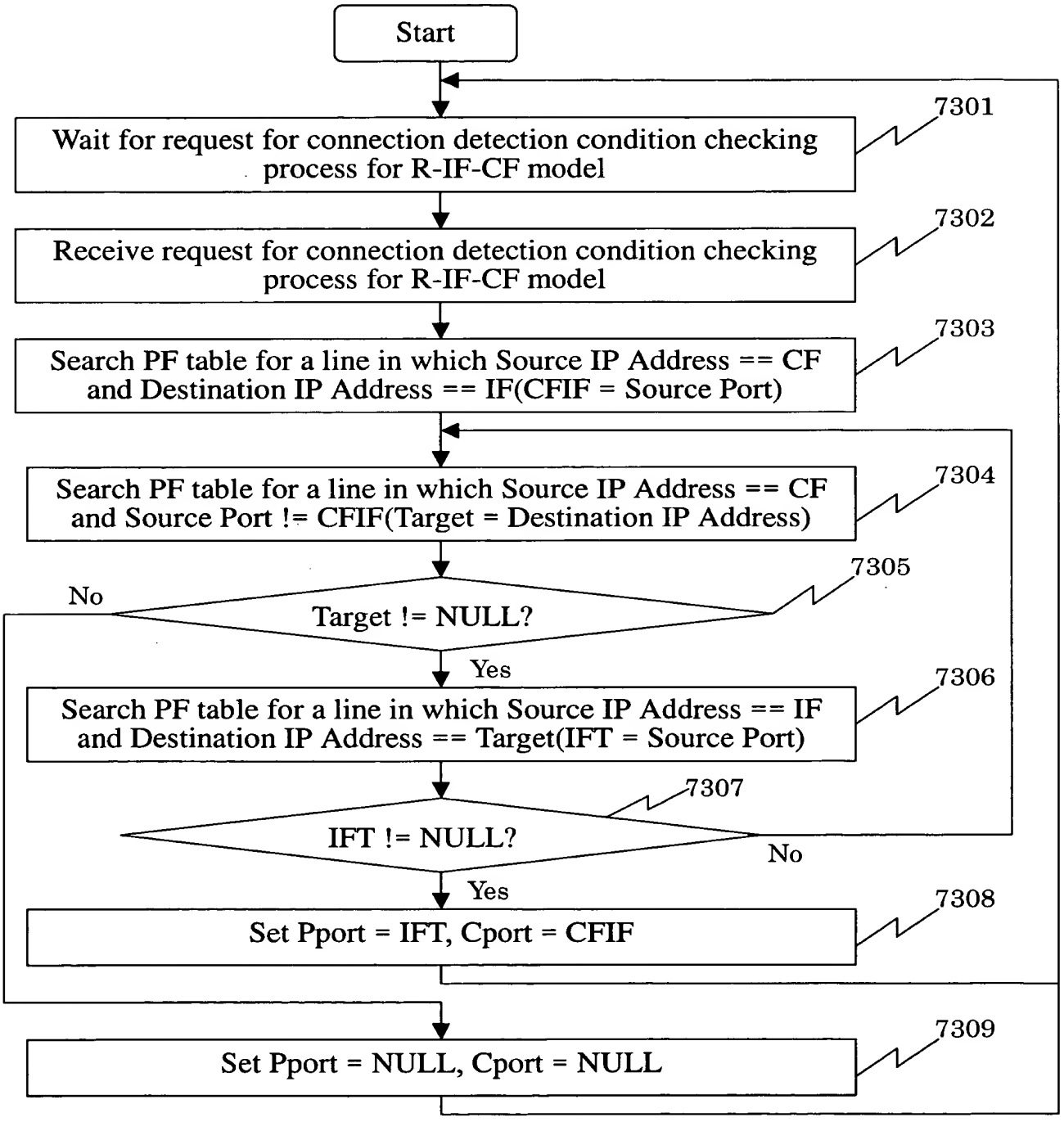


Fig. 74

Operation Flowchart 22 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for R-CF-IF Model) (Fig.25))

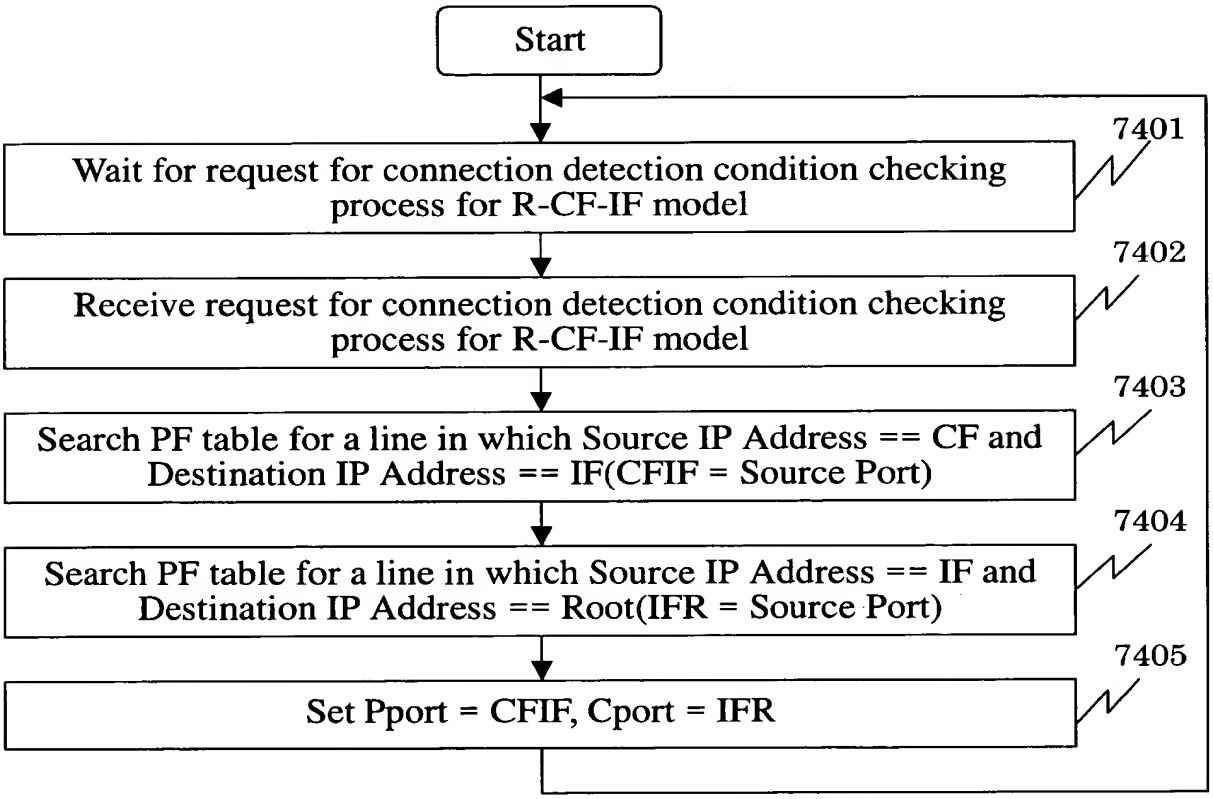


Fig. 75

Operation Flowchart 23 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for Set (R, CF, SF)) (Fig.25))

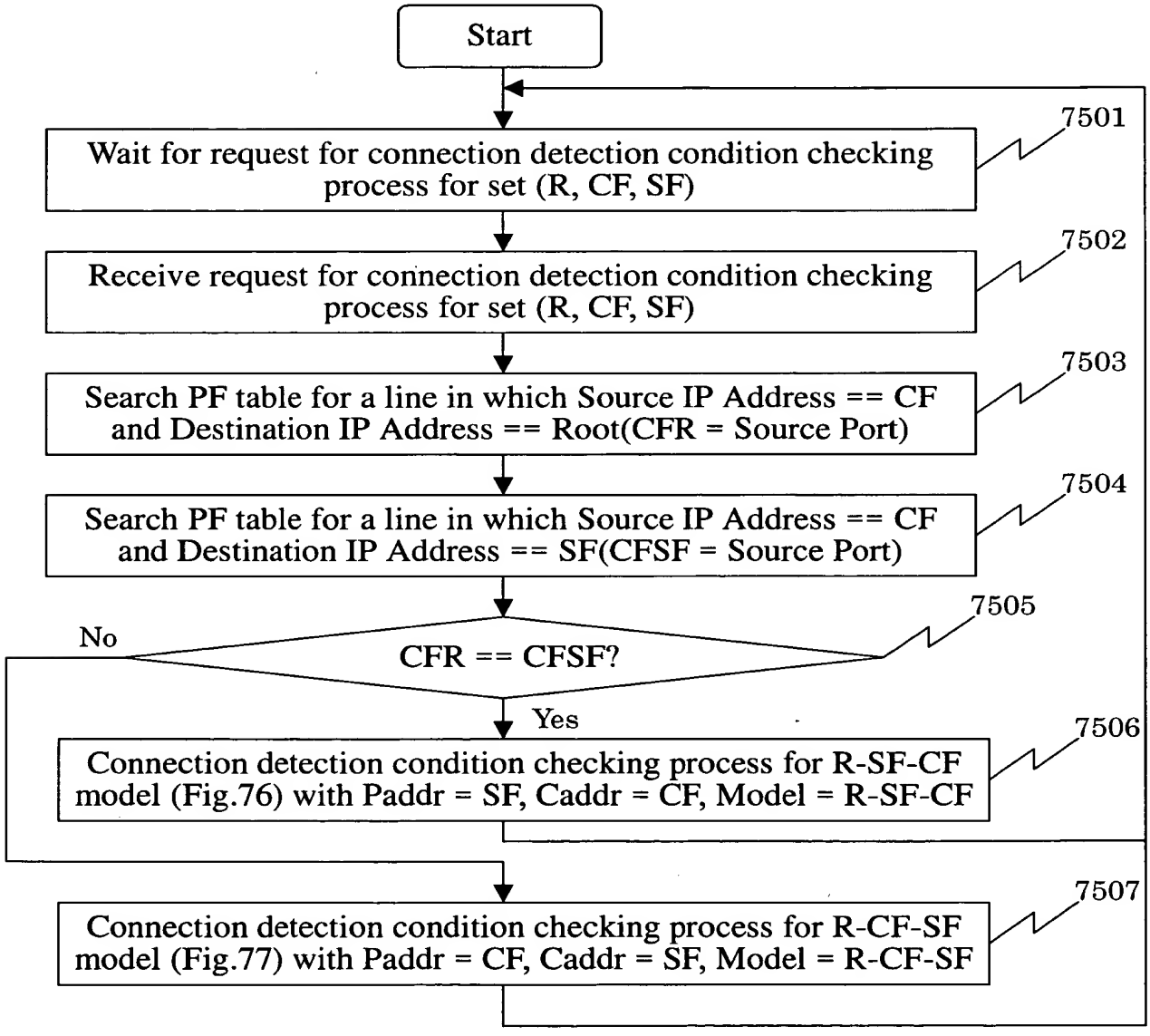


Fig. 76

Operation Flowchart 24 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for R-SF-CF Model) (Fig.25))

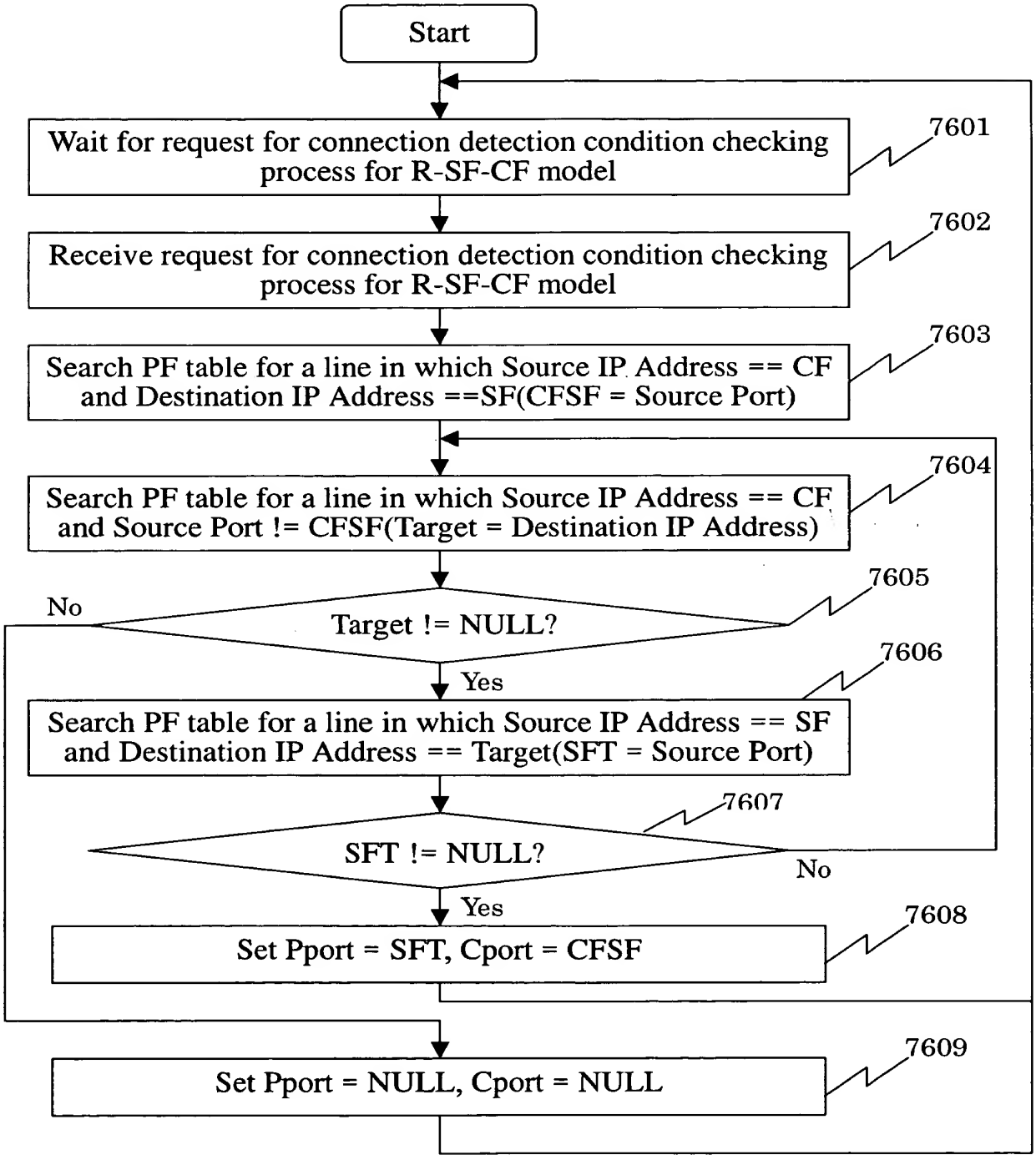


Fig. 77

Operation Flowchart 25 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for R-CF -SF Model) (Fig.25))

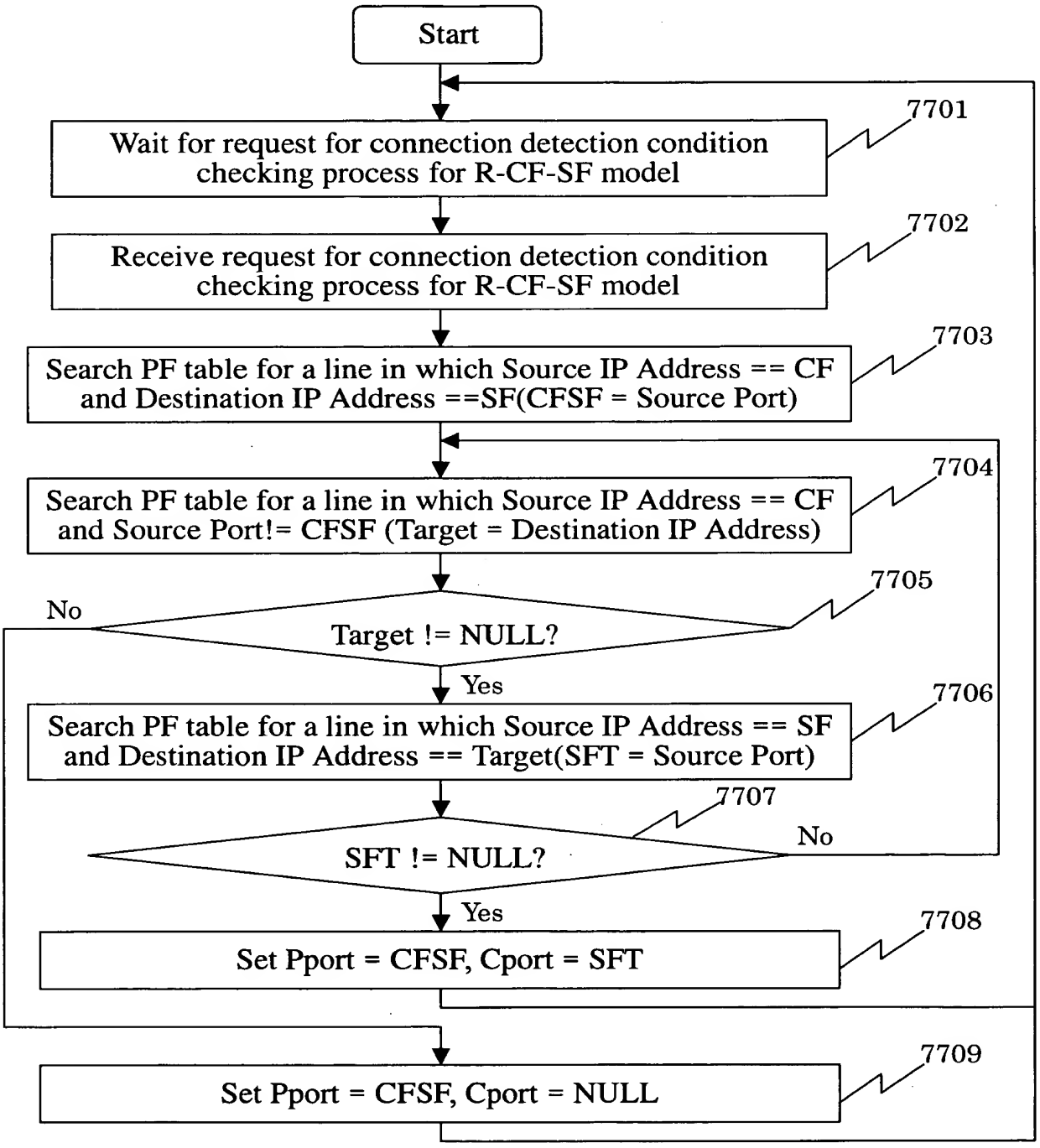


Fig. 78

Operation Flowchart 26 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for Set (R, IF, IF)) (Fig.25))

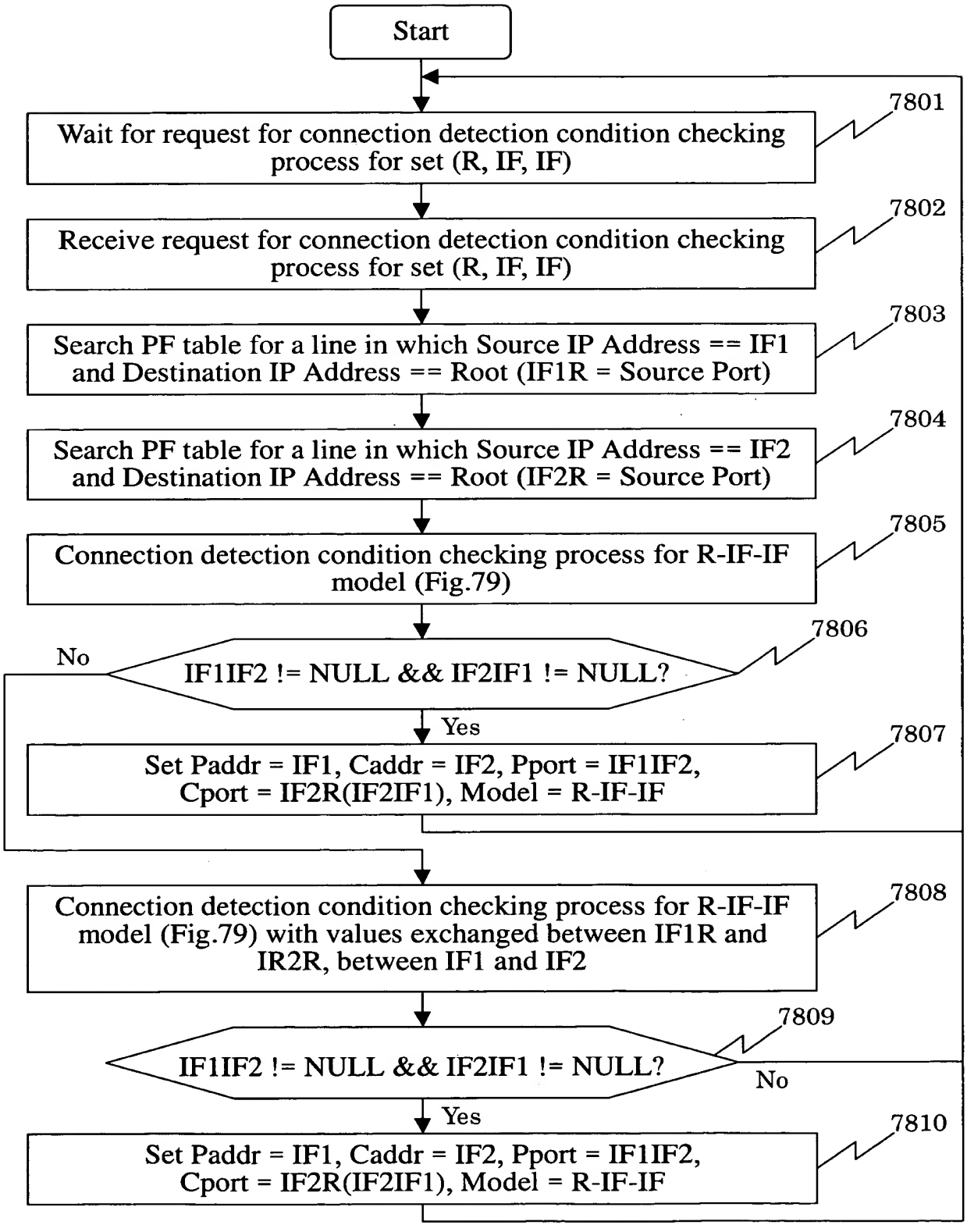


Fig. 79

Operation Flowchart 27 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for R-IF-IF Model) (Fig.25))

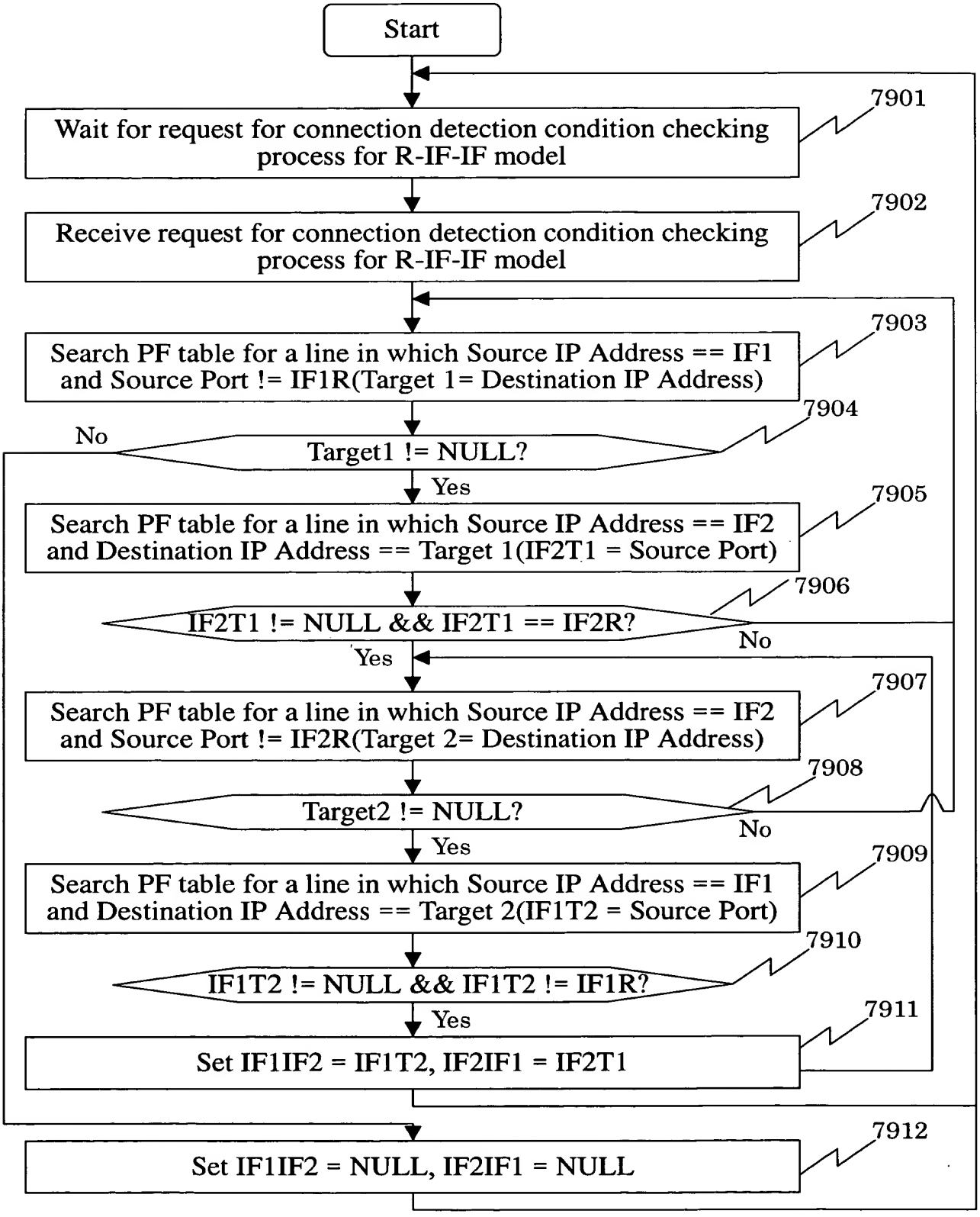


Fig. 80

Operation Flowchart 28 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for Set (R, IF, SF)) (Fig.25))

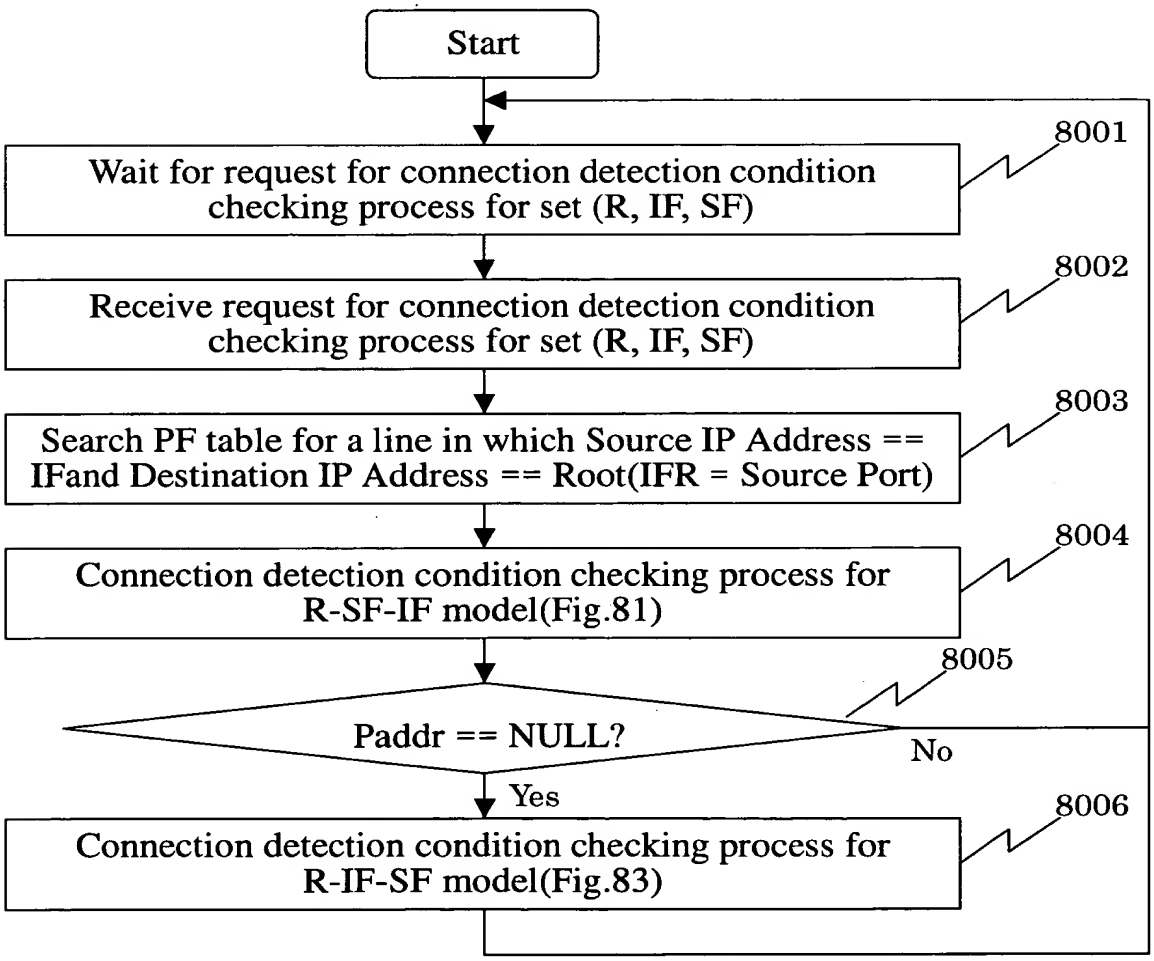


Fig. 81

Operation Flowchart 29 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for R-SF-IF Model) (Fig.25))

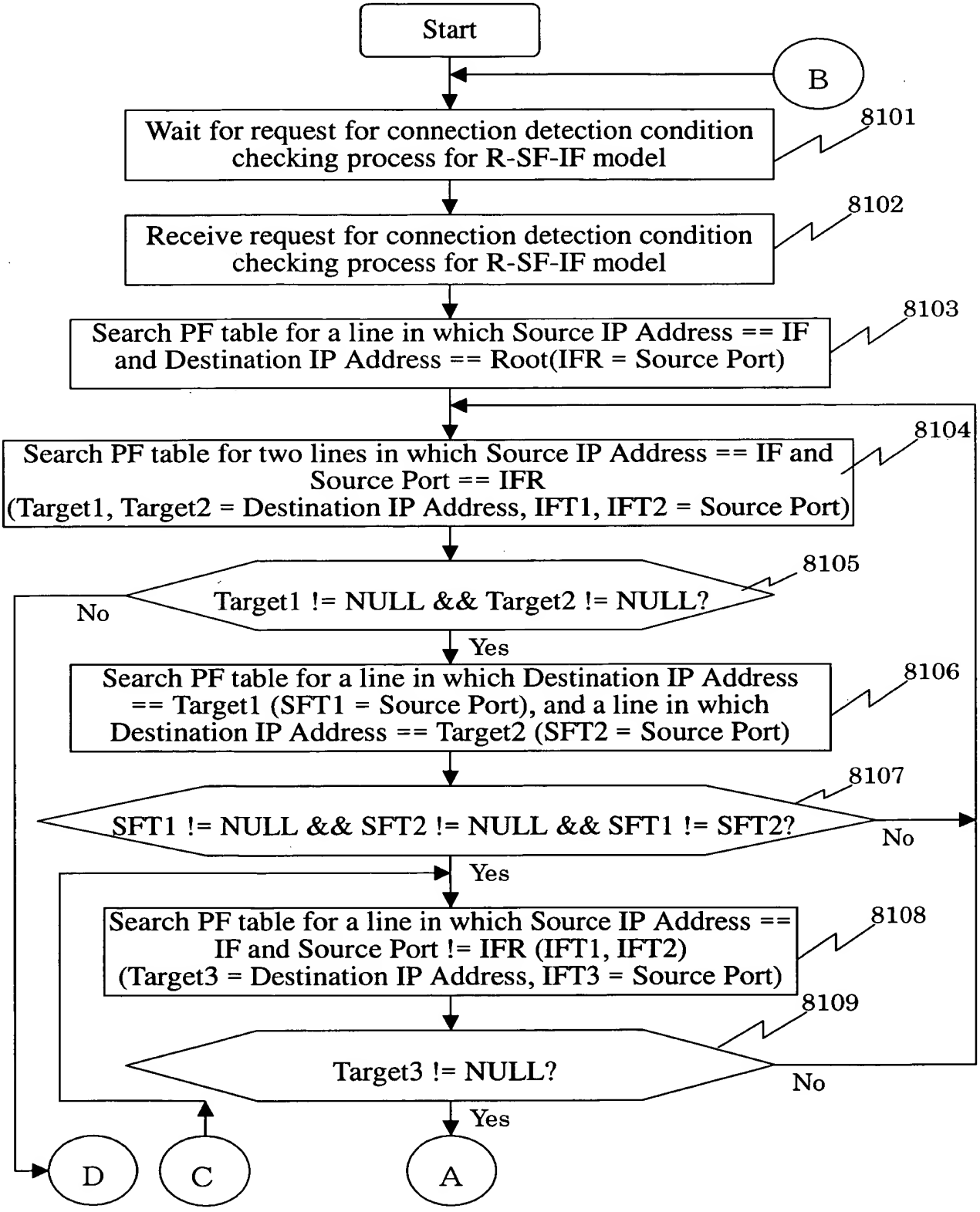


Fig. 82

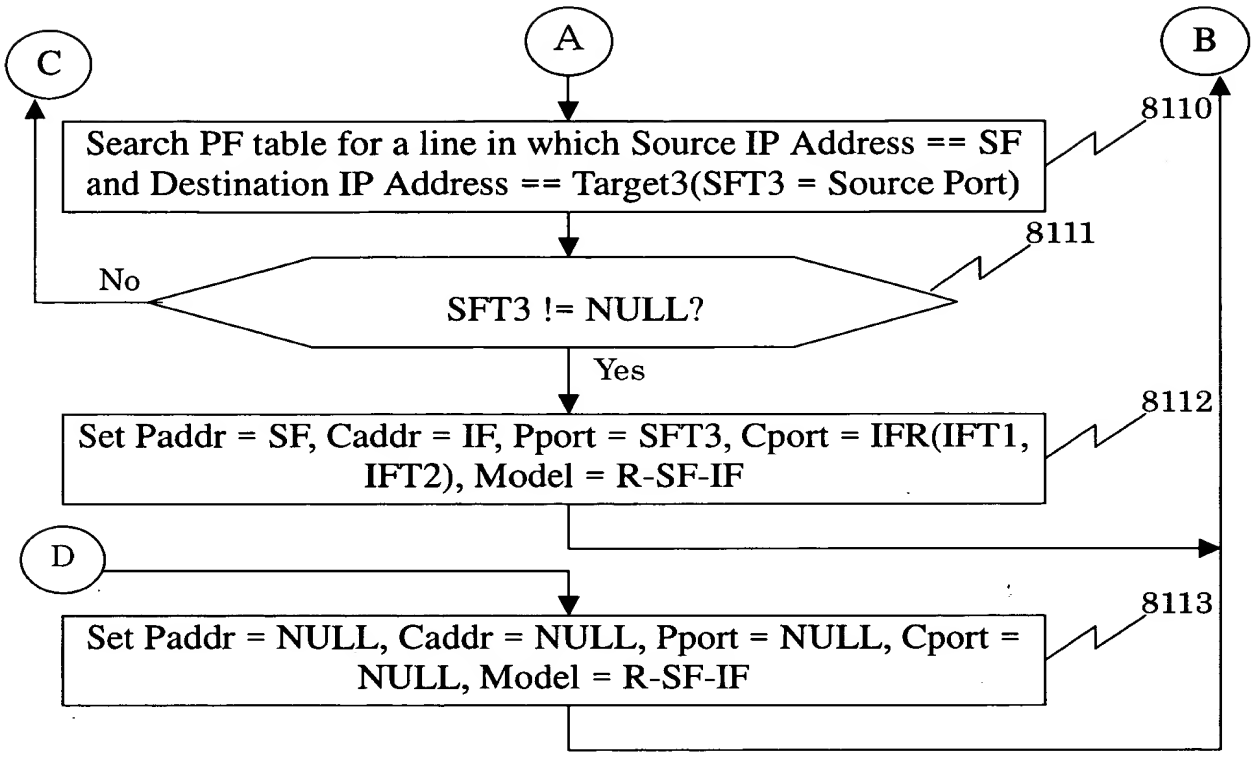

A
B
C
D
Search PF table for a line in which Source IP Address == SF and Destination IP Address == Target3(SFT3 = Source Port)
8110
SFT3 != NULL?
8111
No
Yes
Set Paddr = SF, Caddr = IF, Pport = SFT3, Cport = IFR(IFT1, IFT2), Model = R-SF-IF
8112
Set Paddr = NULL, Caddr = NULL, Pport = NULL, Cport = NULL, Model = R-SF-IF
8113

Fig. 83

Operation Flowchart 30 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for R-IF-SF Model) (Fig.25))

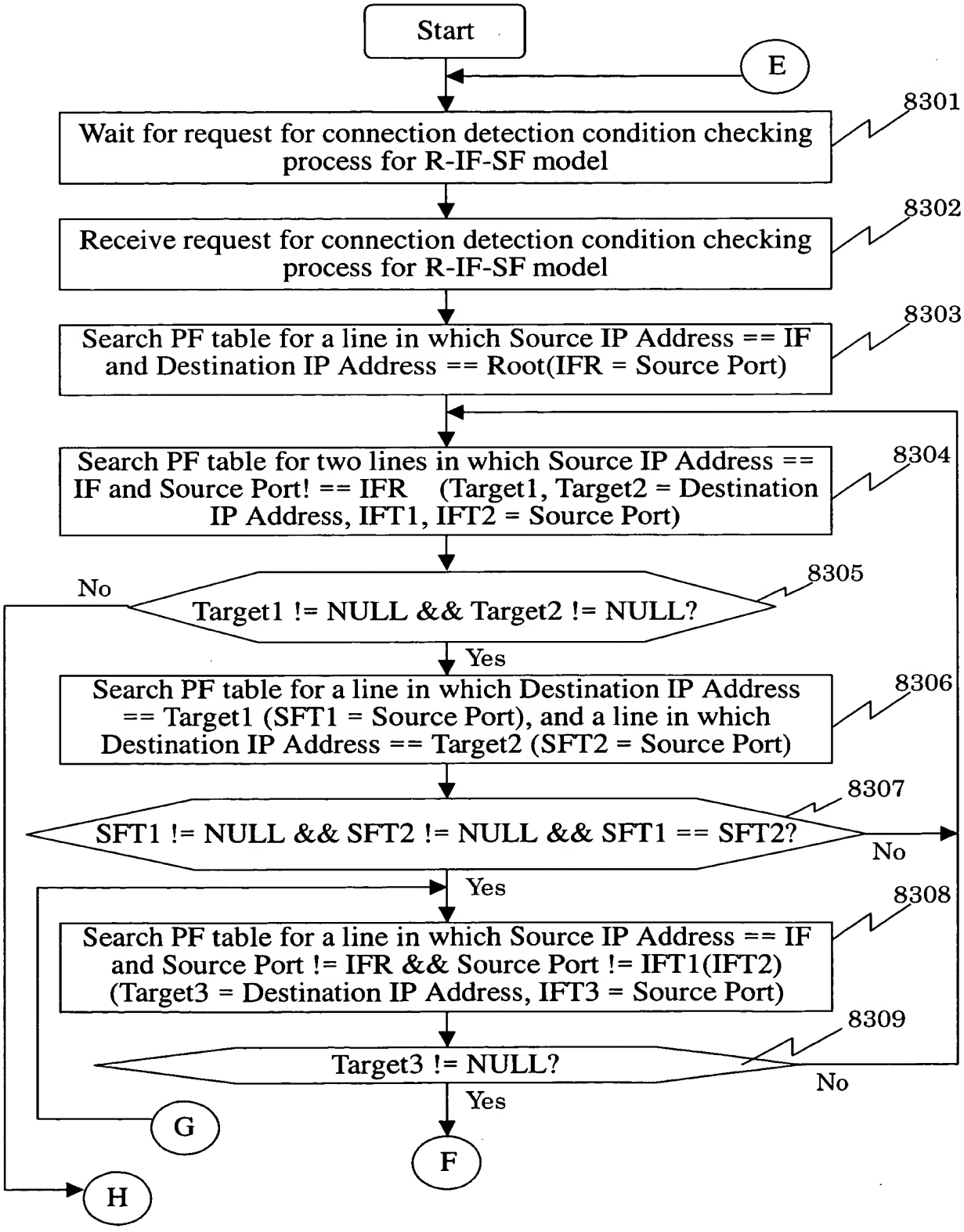


Fig. 84

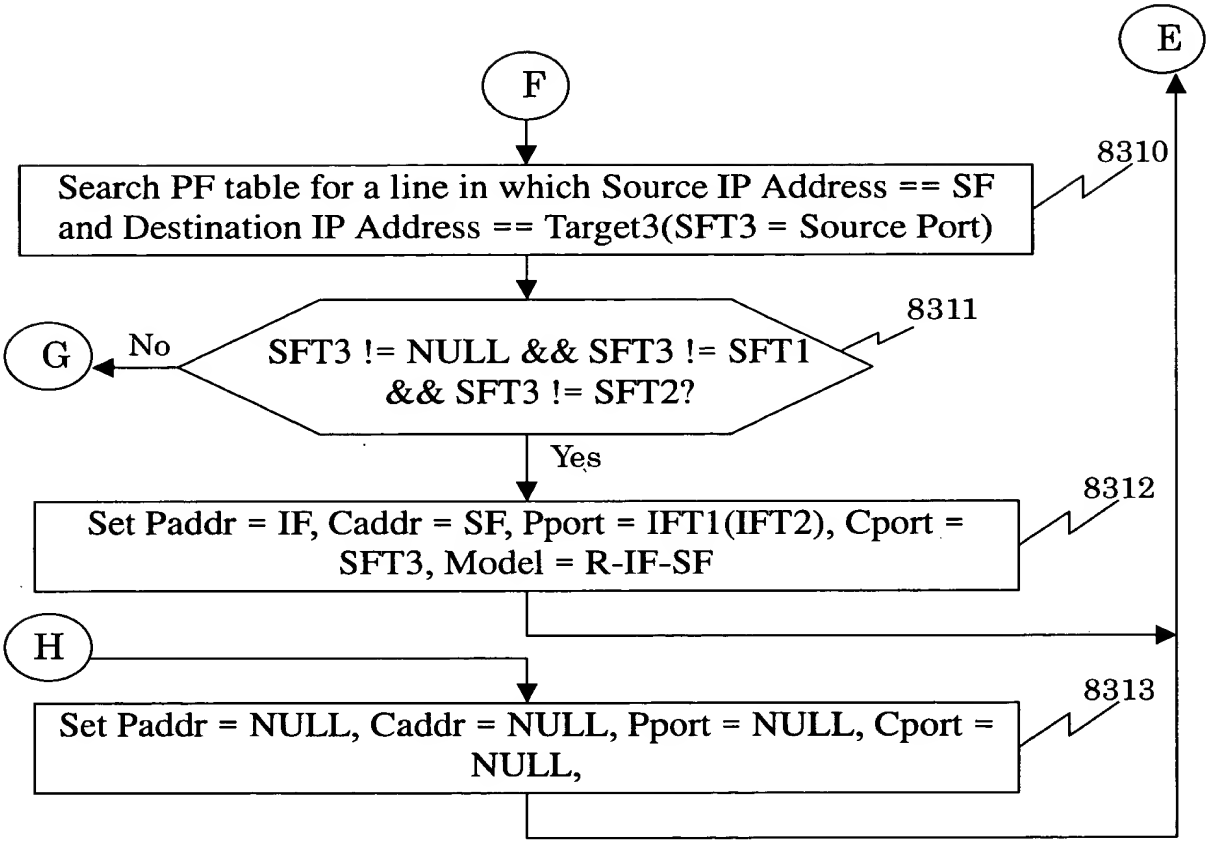

E
F
Search PF table for a line in which Source IP Address == SF and Destination IP Address == Target3(SFT3 = Source Port)
8310
SFT3 != NULL && SFT3 != SFT1 && SFT3 != SFT2?
8311
No
G
Yes
Set Paddr = IF, Caddr = SF, Pport = IFT1(IFT2), Cport = SFT3, Model = R-IF-SF
8312
H
Set Paddr = NULL, Caddr = NULL, Pport = NULL, Cport = NULL,
8313

Fig. 85

Operation Flowchart 31 for Auto Discovery Module
(TS Table Creation(Connection Detection Condition Checking Process for Set (R, SF, SF)) (Fig.25))

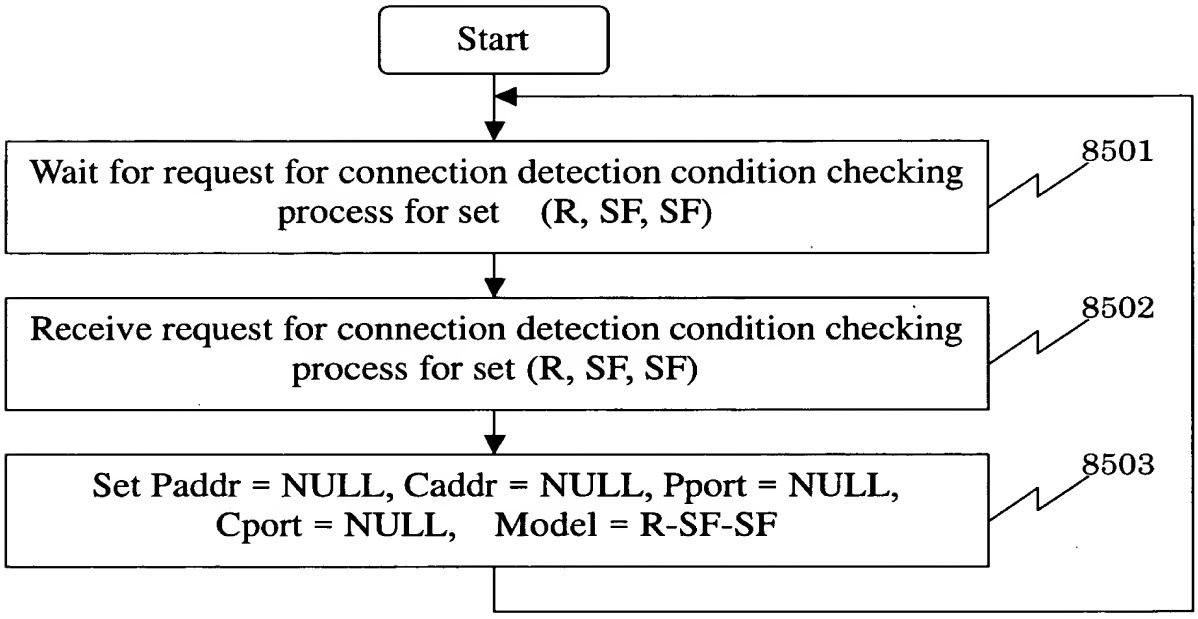


Fig. 86

Operation Flowchart 32 for Auto Discovery Module
(TS Table Creation (Entry Addition Process on TS Table))

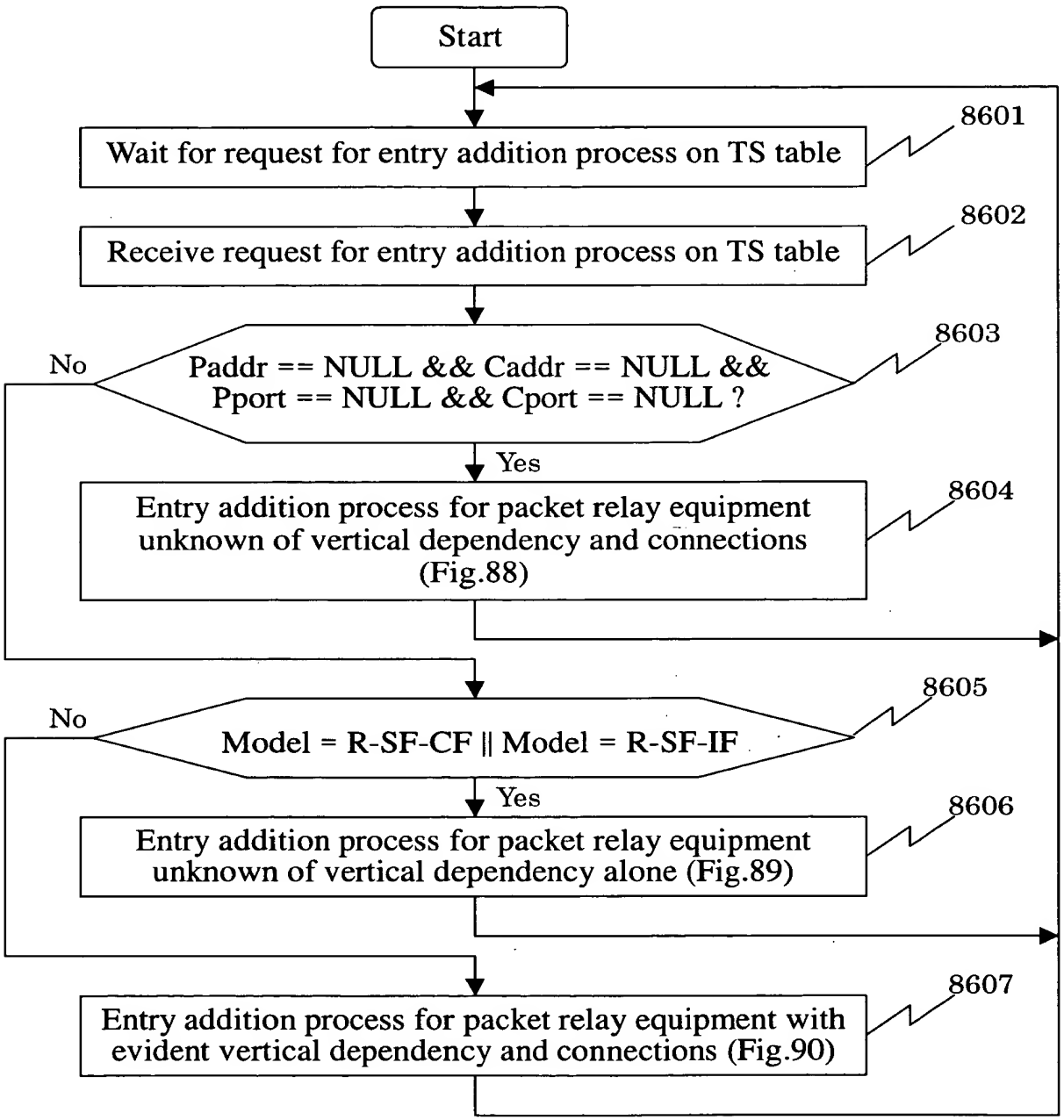


Fig. 87

Operation Flowchart 33 for Auto Discovery Module
(TS Table Creation (Root Entry Addition process on TS Table))

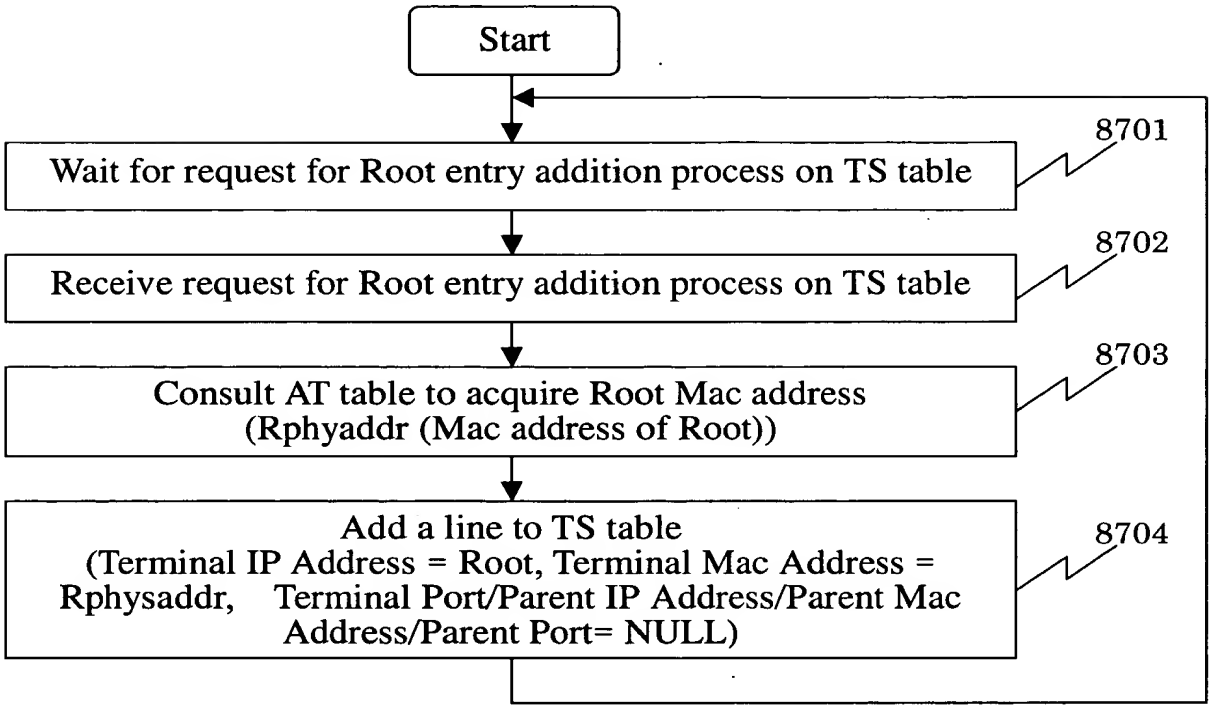


Fig. 88

Operation Flowchart 34 for Auto Discovery Module TS Table Creation (TS Table Creation (Entry Addition process for Packet Relay Equipment Unknown of Vertical Dependency And Connections))

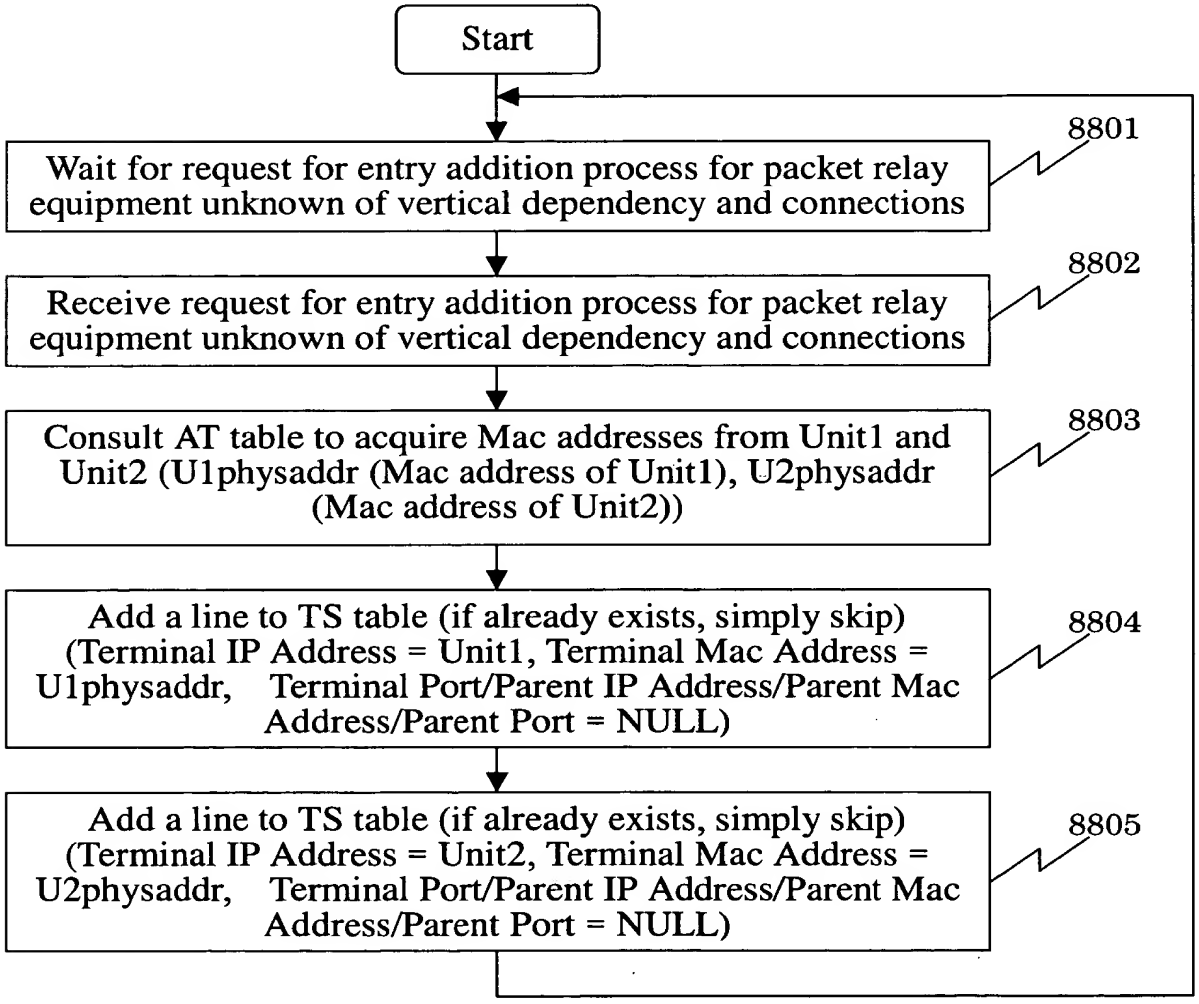


Fig. 89

Operation Flowchart 35 for Auto Discovery Module TS Table Creation (TS Table Creation (Entry Addition process for Packet Relay Equipment Unknown of Vertical Dependency Alone))

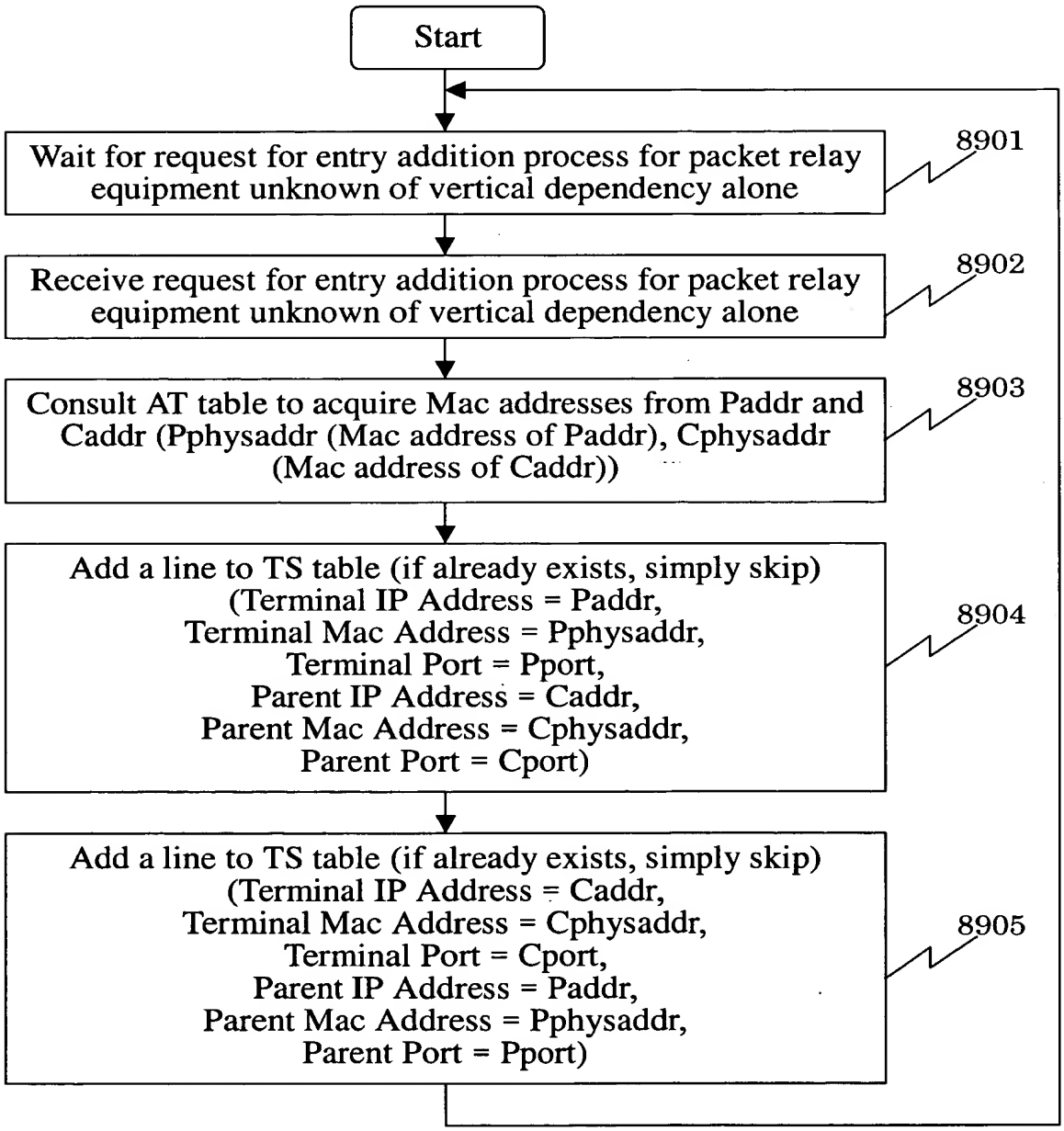


Fig.90

Operation Flowchart 36 for Auto Discovery Module TS Table Creation
(TS Table Creation (Entry Addition process for Packet Relay Equipment with Evident Vertical Dependency And Connections))

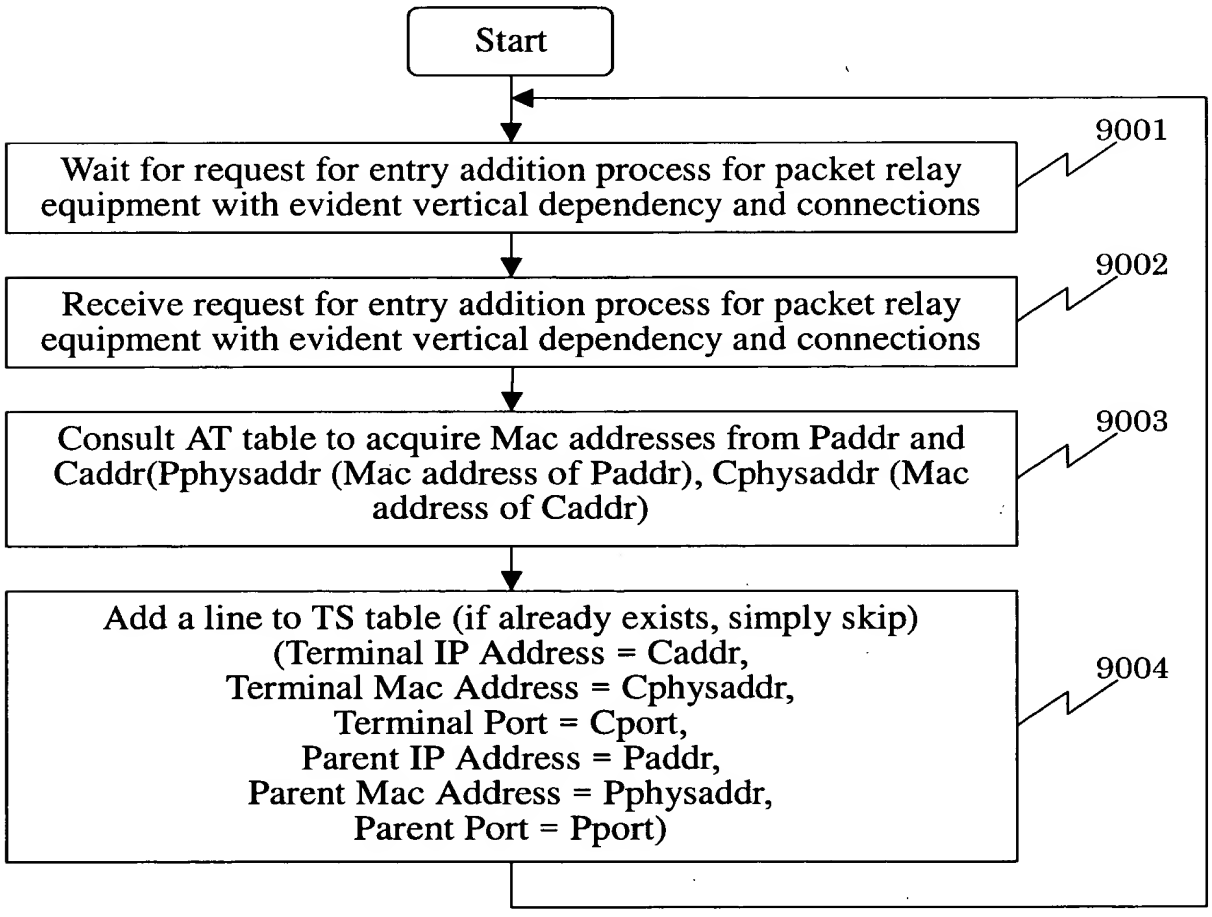


Fig. 91

Operation Flowchart 37 for Auto Discovery Module TS Table Creation
TS Table Creation (Vertical Dependency Determination process))

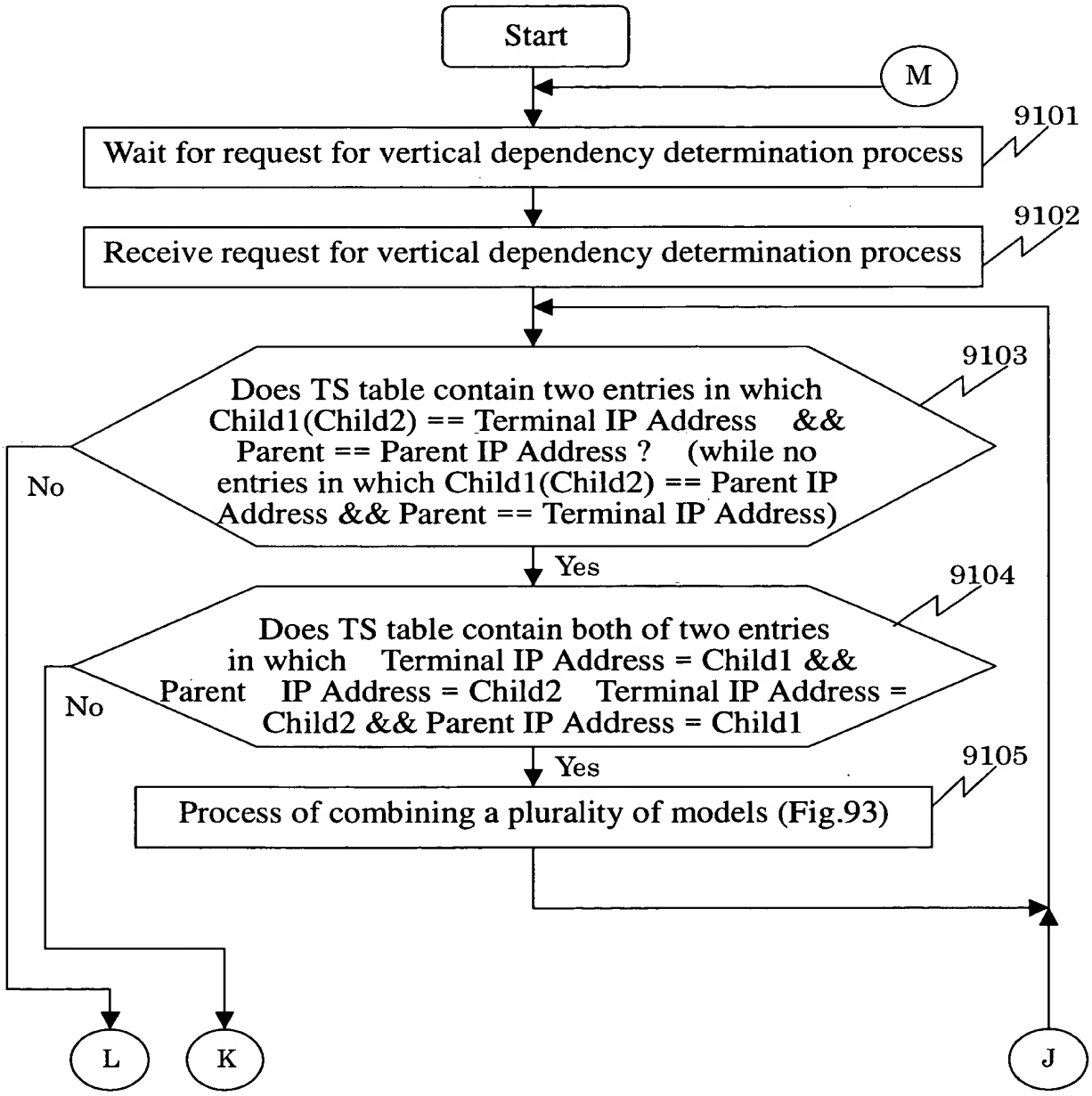


Fig. 92

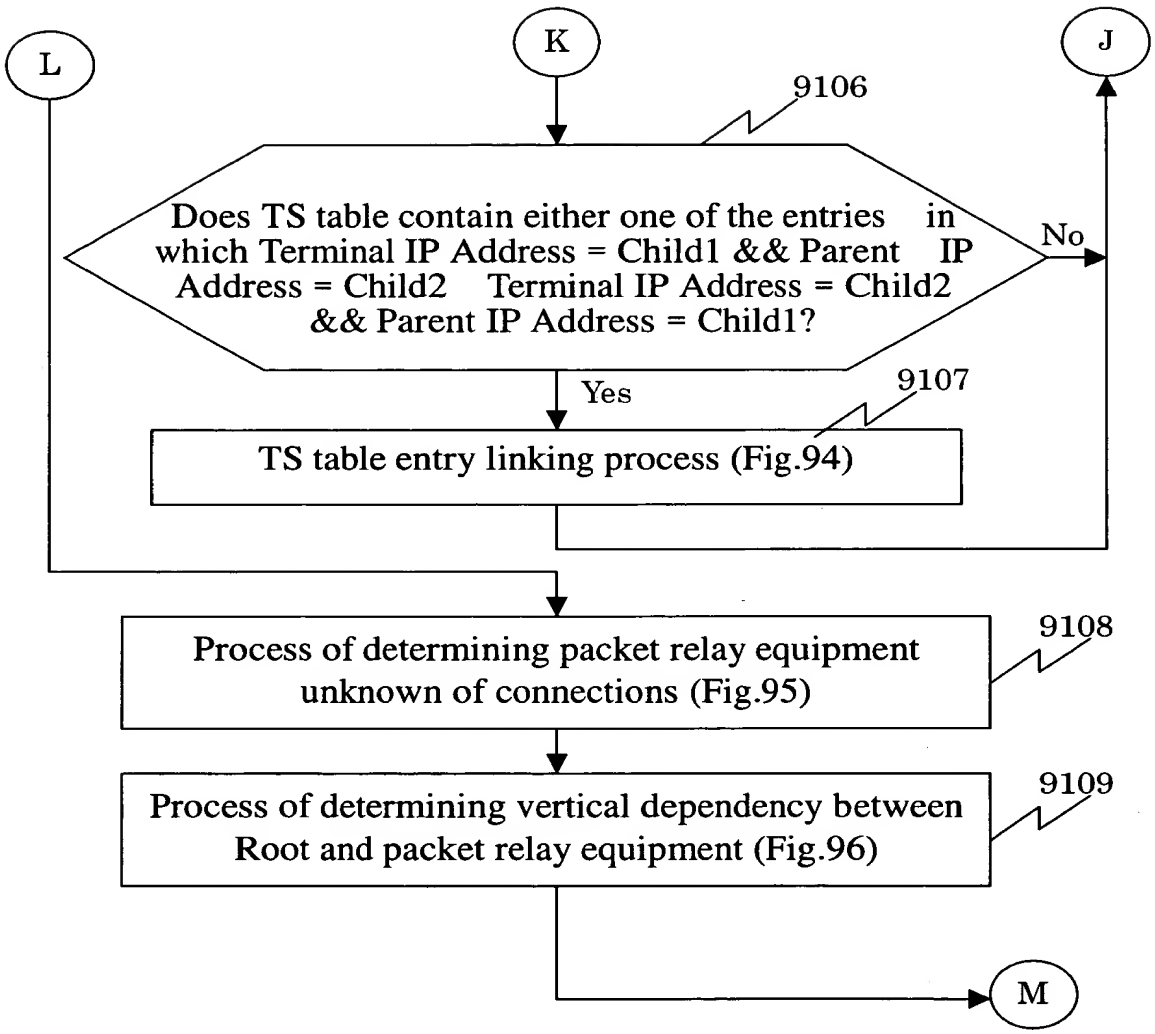

L
K
J
9106
Does TS table contain either one of the entries in which Terminal IP Address = Child1 && Parent IP Address = Child2 Terminal IP Address = Child2 && Parent IP Address = Child1?
No
Yes
9107
TS table entry linking process (Fig.94)
Process of determining packet relay equipment unknown of connections (Fig.95)
9108
Process of determining vertical dependency between Root and packet relay equipment (Fig.96)
9109
M

Fig. 93

Operation Flowchart 38 for Auto Discovery Module TS Table Creation
(TS Table Creation (Process of Combining Plurality of Models (Fig.30))

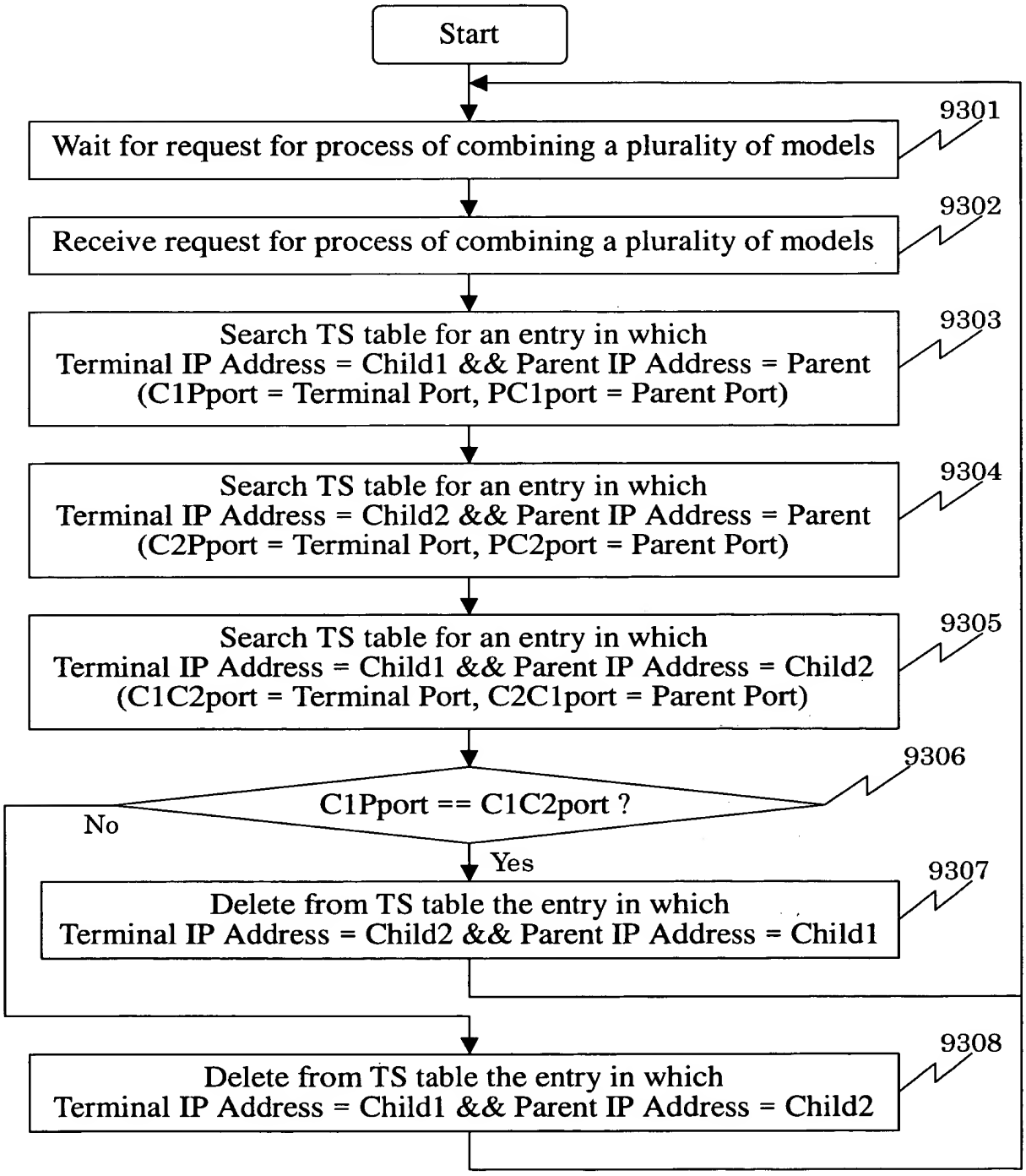


Fig. 94

Operation Flowchart 39 for Auto Discovery Module TS Table Creation
TS Table Creation (TS Table Entry Linking Process)

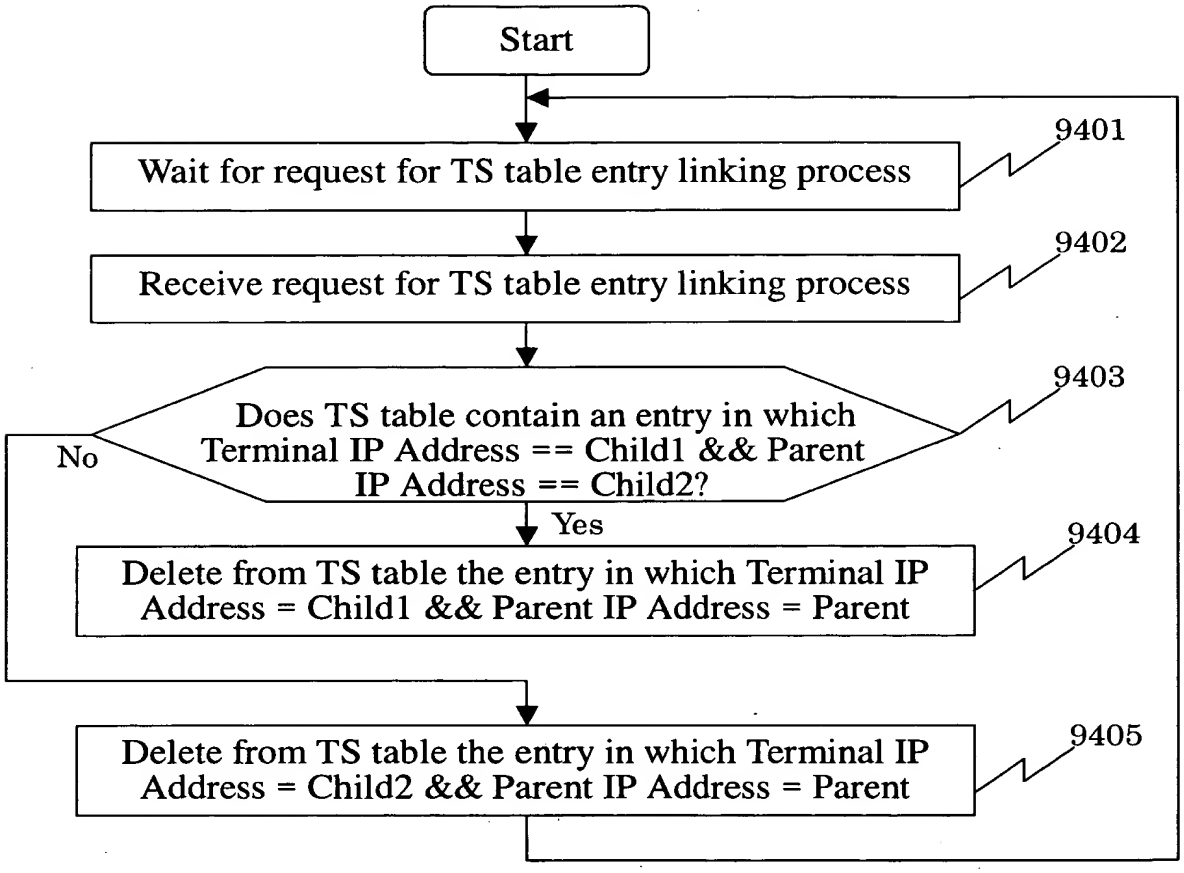


Fig. 95

Operation Flowchart 40 for Auto Discovery Module TS Table Creation
TS Table Creation (Process of Determining Packet Relay Equipment Unknown of Connections)

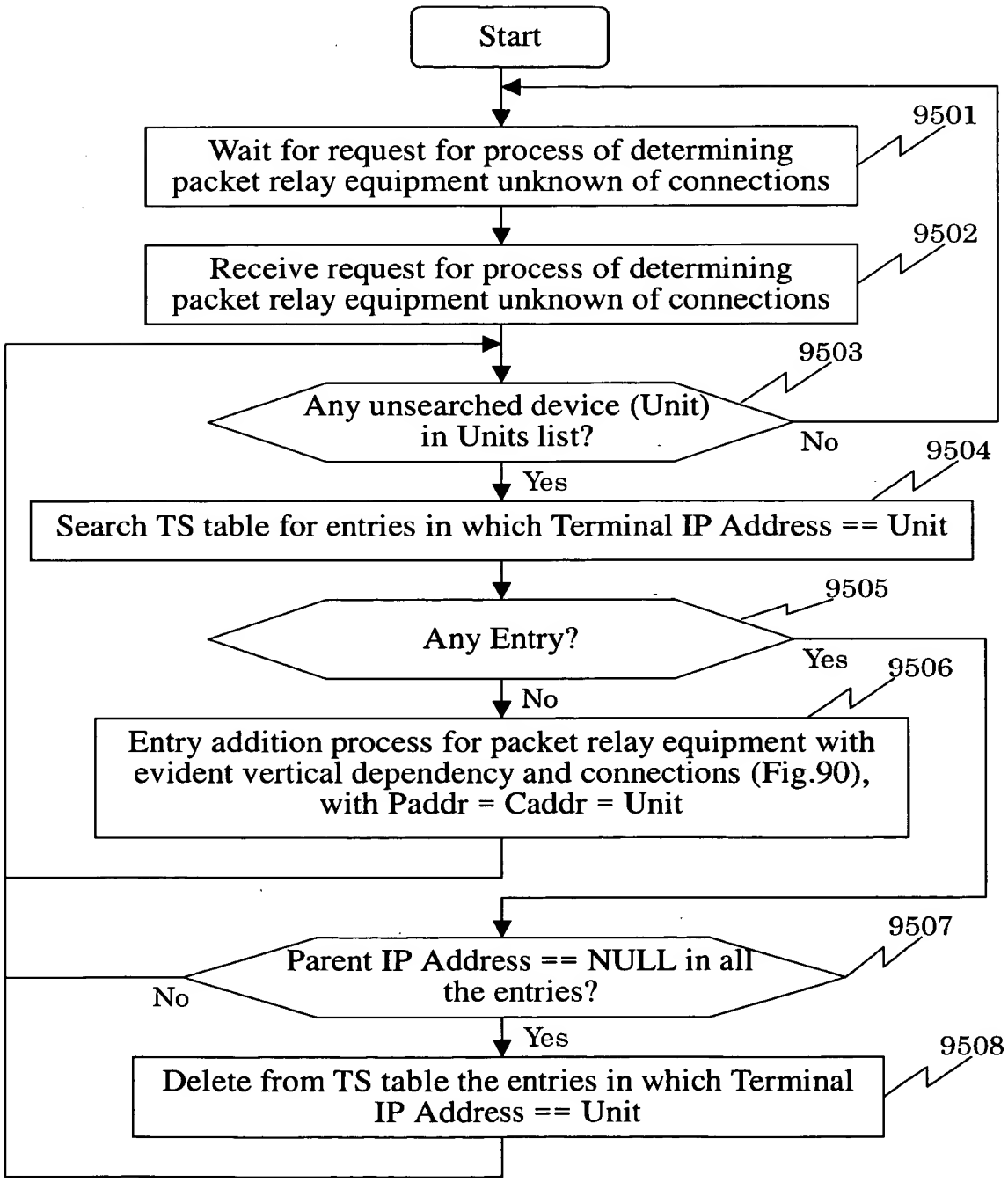


Fig. 96

Operation Flowchart 41 for Auto Discovery Module TS Table Creation
TS Table Creation (Process of Determining Vertical Dependency between Root and Packet Relay Equipment)

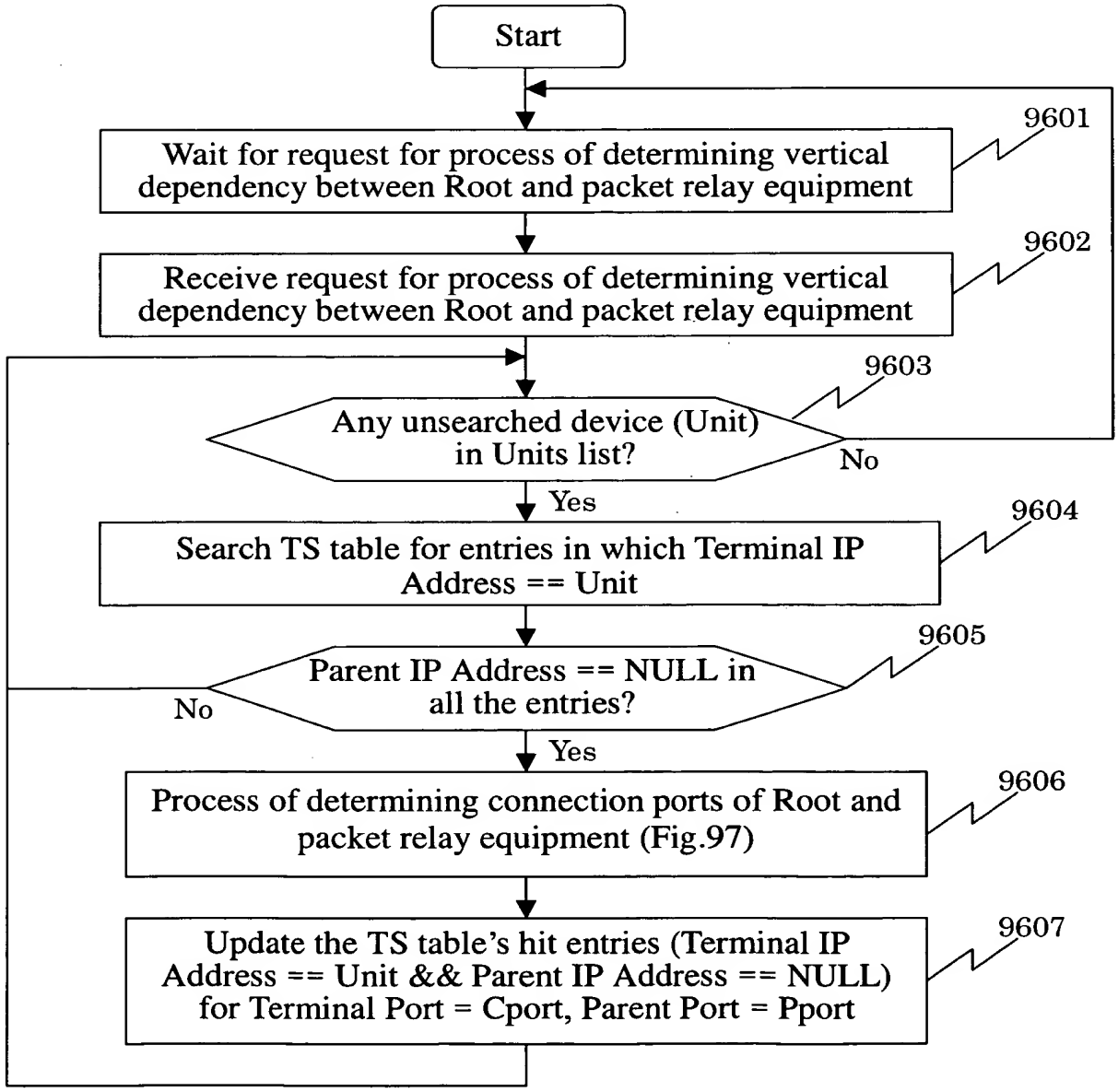


Fig. 97

Operation Flowchart 42 for Auto Discovery Module TS Table Creation
TS Table Creation (Process of Determining Connection Ports of Root and Packet Relay Equipment)

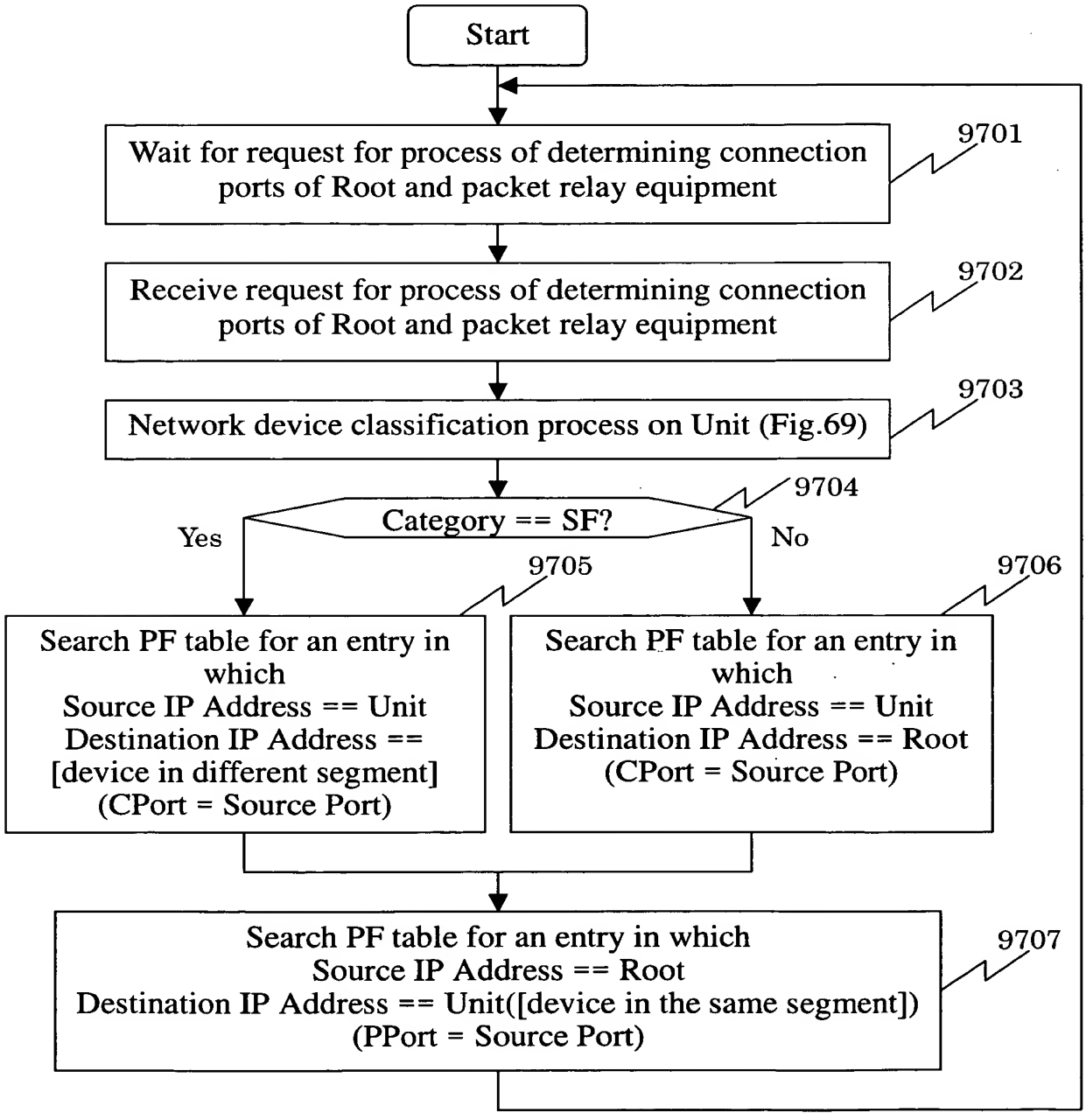


Fig. 98

Operation Flowchart 43 for Auto Discovery Module TS Table Creation
TS Table Creation (Process of Determining Connections between Packet Relay Equipment and Terminal)

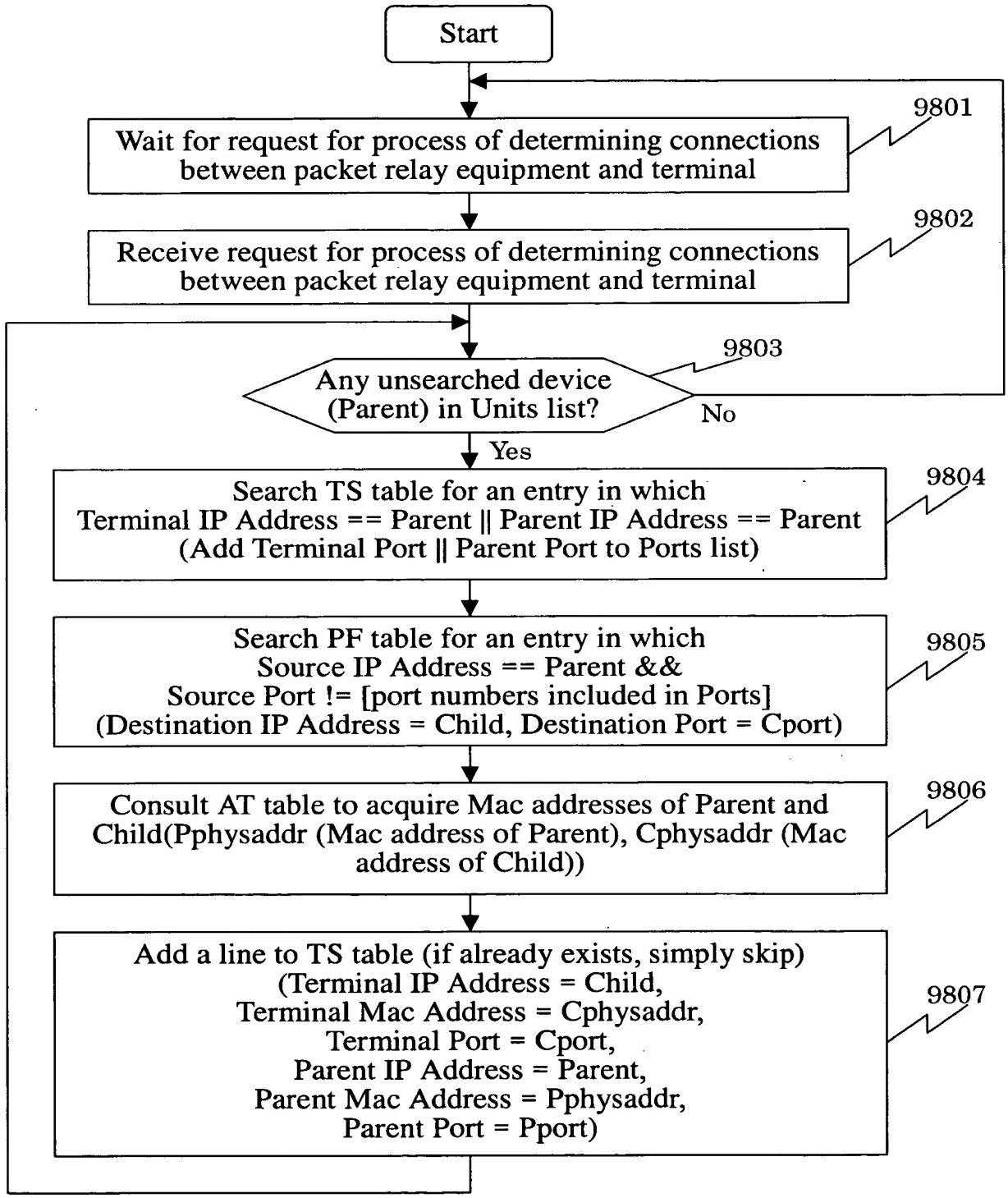


Fig. 99

Operation Flowchart 44 for Auto Discovery Module TS Table Creation
TS Table Creation (Interfaces MIB Evaluation Process)

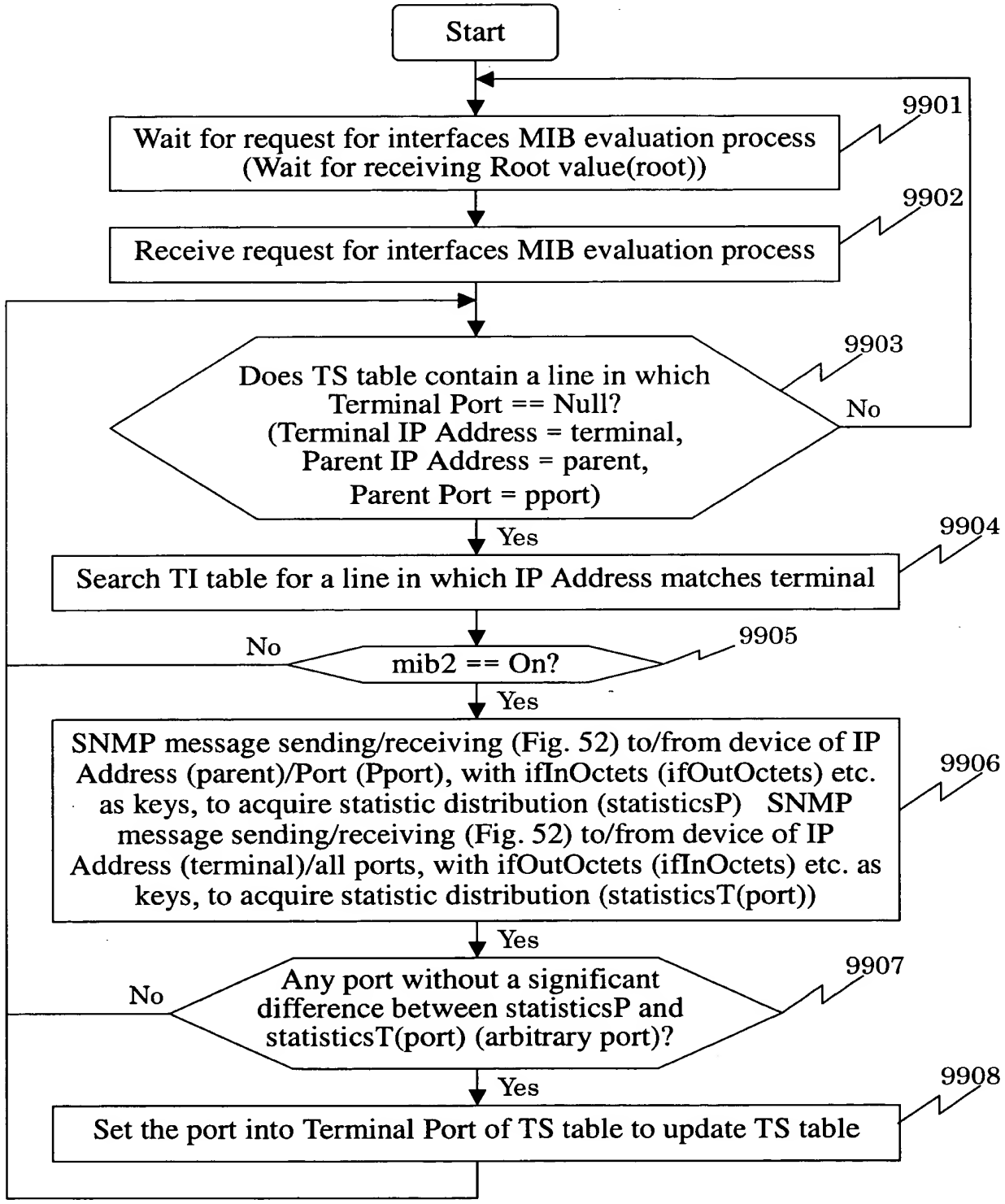


Fig. 100

Operation Flowchart 1 for Chart Display Program
Network Configuration Chart Display Process

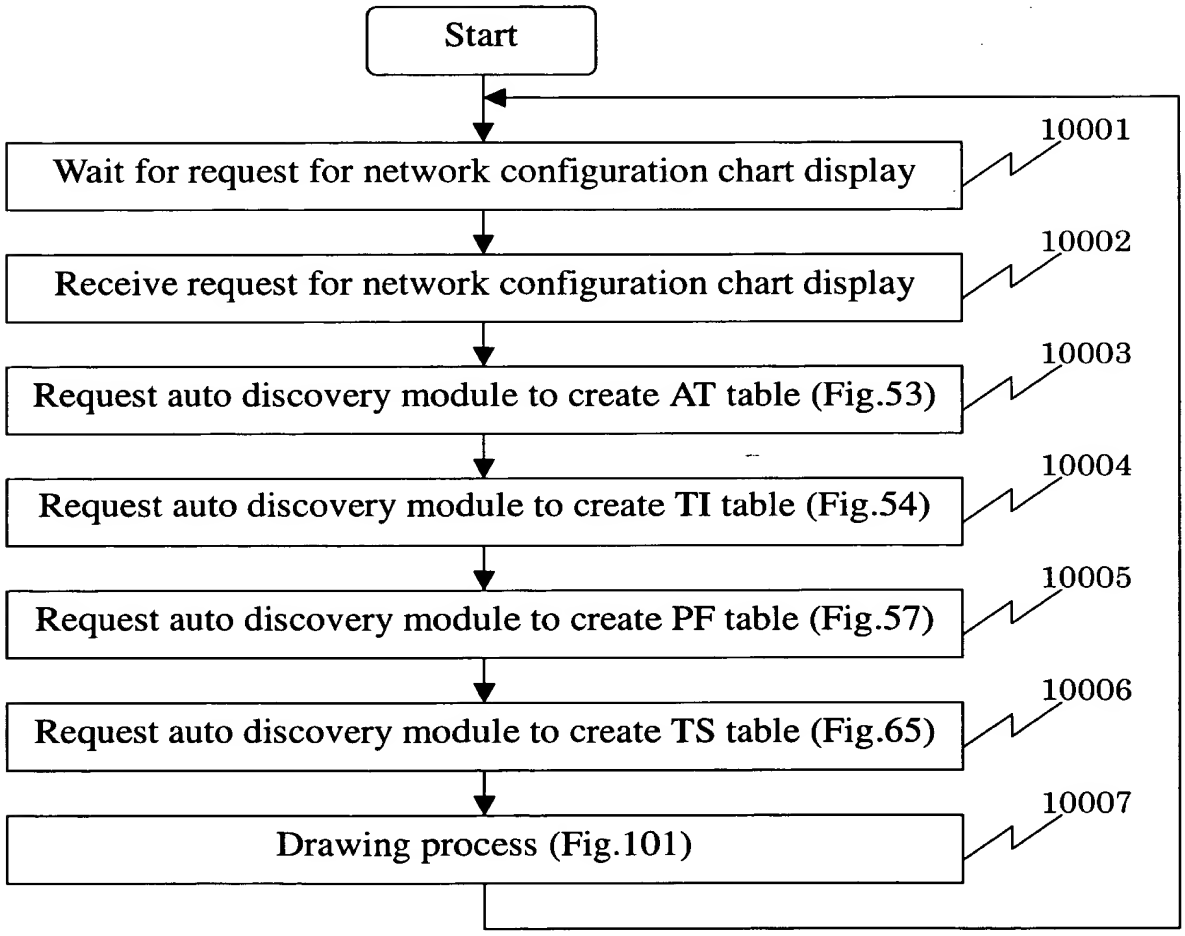


Fig. 101

Operation Flowchart 2 for Chart Display Program
Network Configuration Chart Display (Drawing Process)

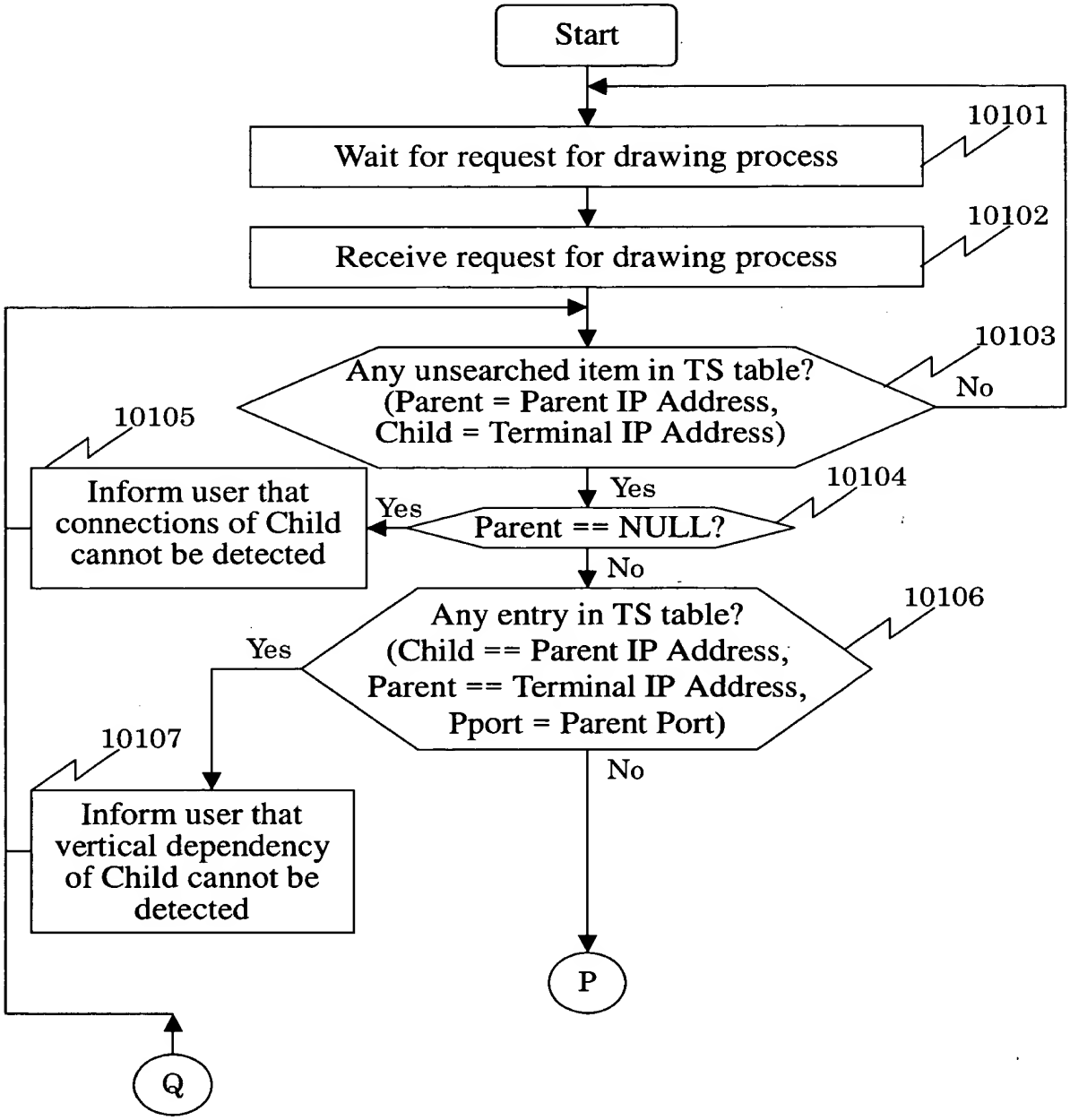


Fig. 102

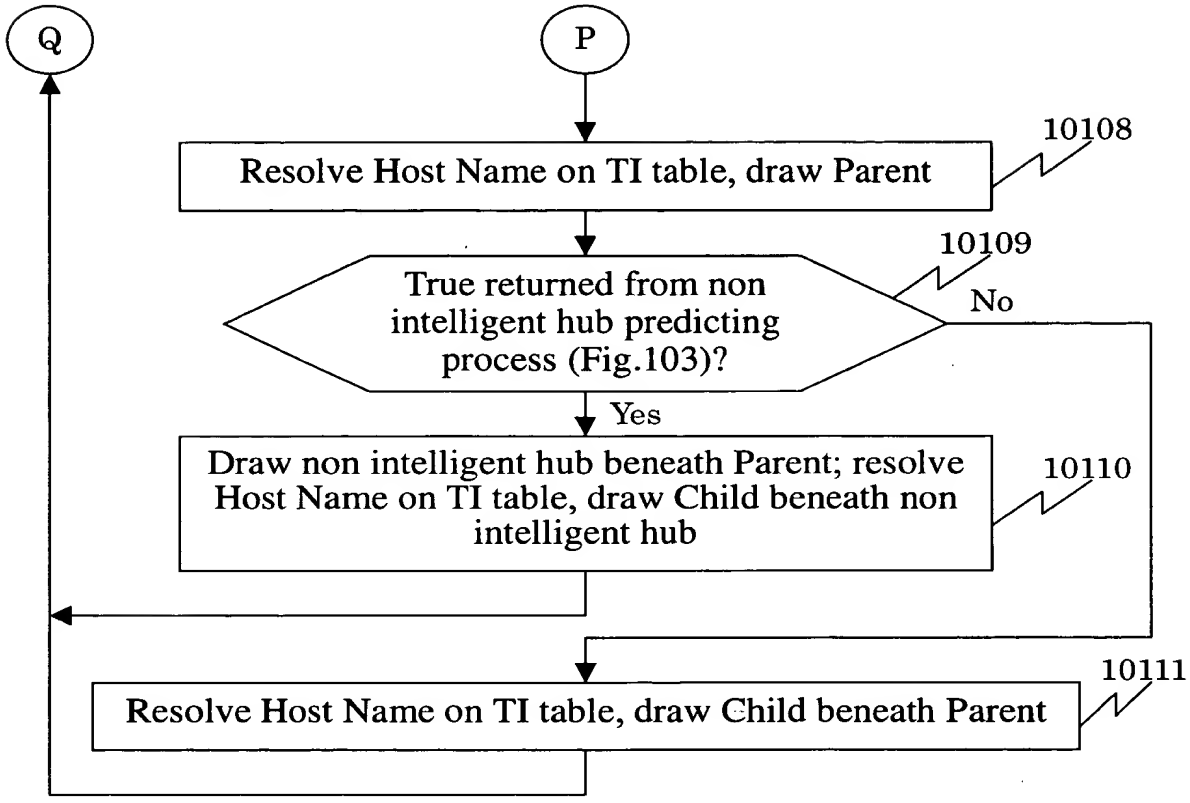

Q
P
Resolve Host Name on TI table, draw Parent
10108
True returned from non intelligent hub predicting process (Fig.103)?
10109
No
Yes
Draw non intelligent hub beneath Parent; resolve Host Name on TI table, draw Child beneath non intelligent hub
10110
Resolve Host Name on TI table, draw Child beneath Parent
10111

Fig. 103

Operation Flowchart 3 for Chart Display Program Drawing (Non Intelligent Hub Predicting Process)

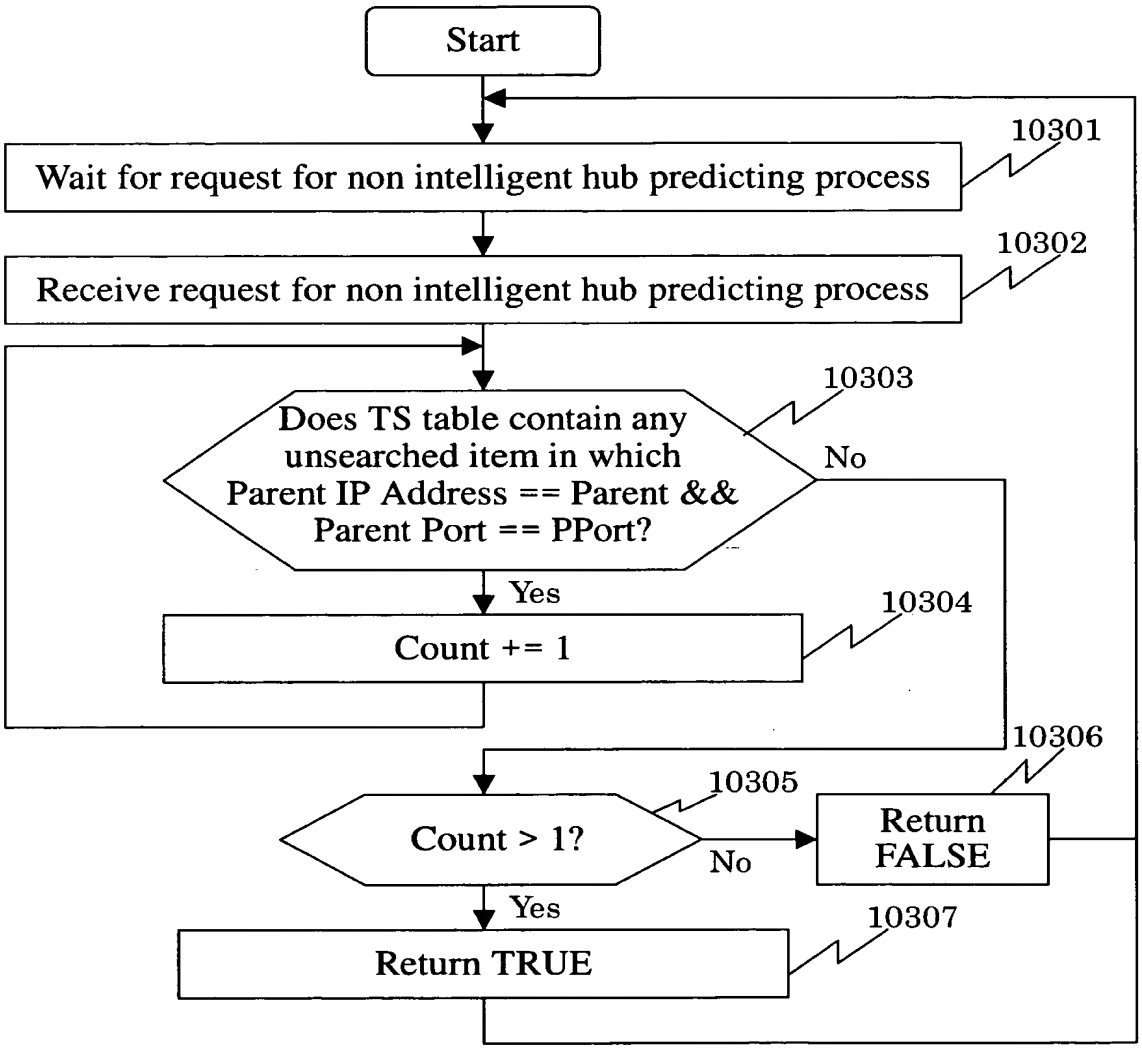


Fig. 104

Operation Flowchart 4 for Chart Display Program
Information Drawing Process

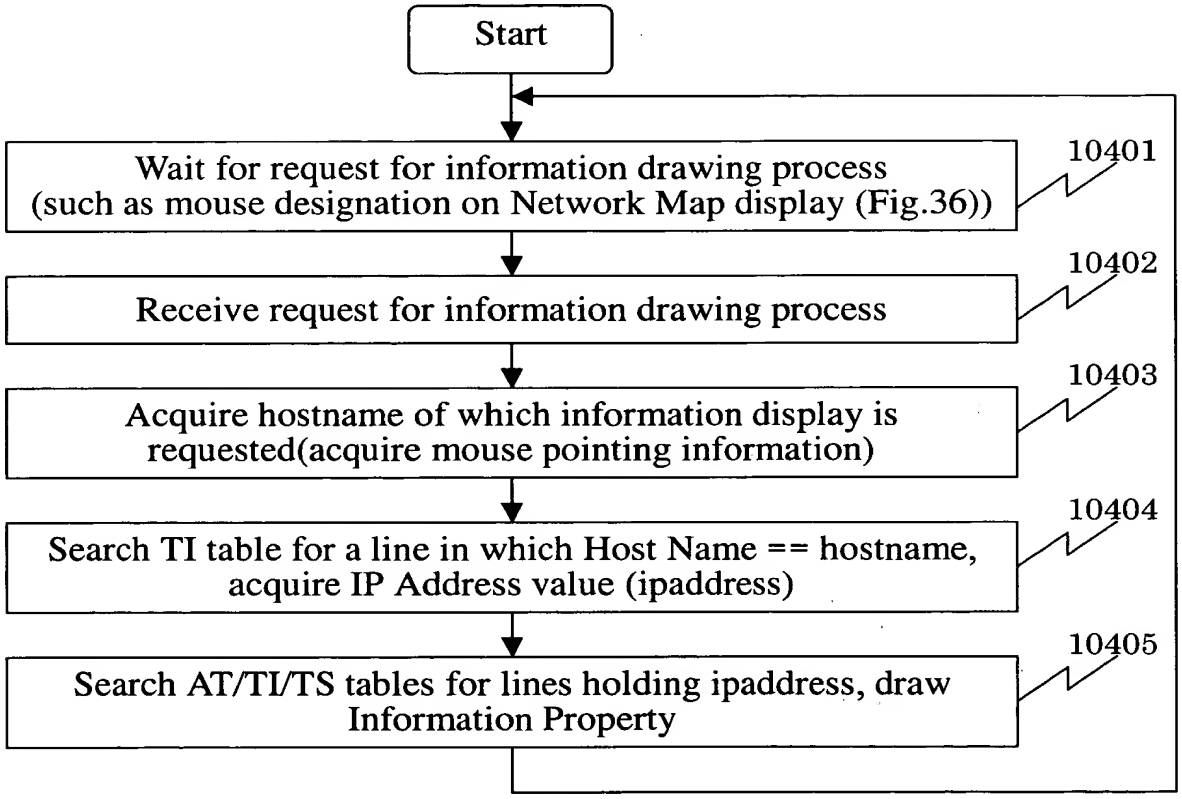


Fig. 105

Operation Flowchart 5 for Chart Display Program
Process of Monitoring Modification of Connection Destination

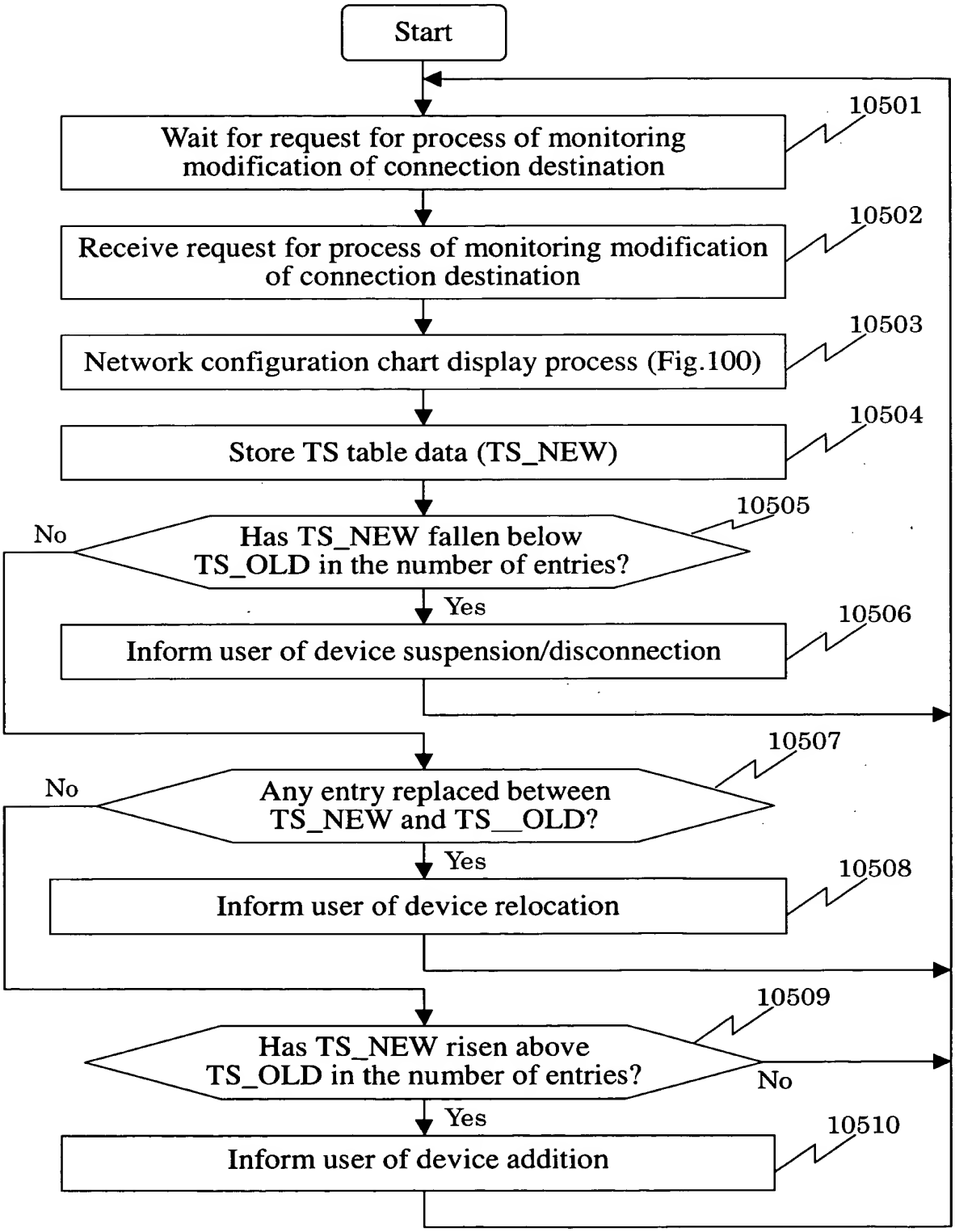


Fig. 106

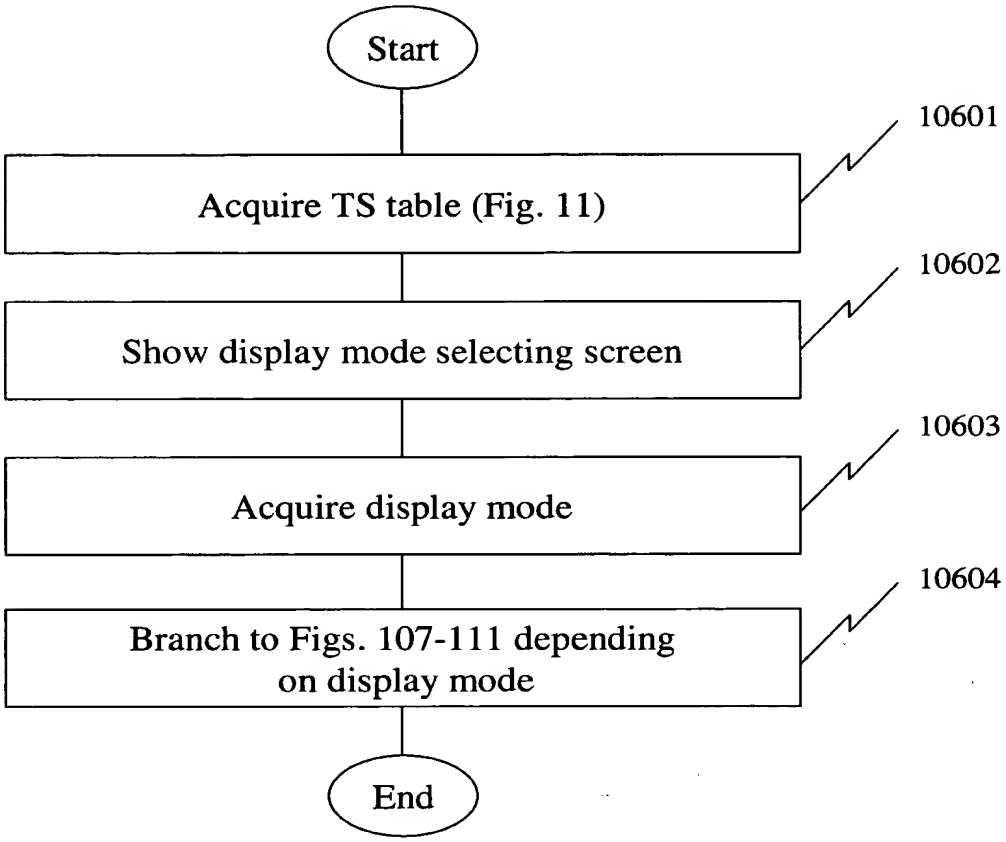

Start
10601
Acquire TS table (Fig. 11)
10602
Show display mode selecting screen
10603
Acquire display mode
10604
Branch to Figs. 107-111 depending on display mode
End

Fig. 107

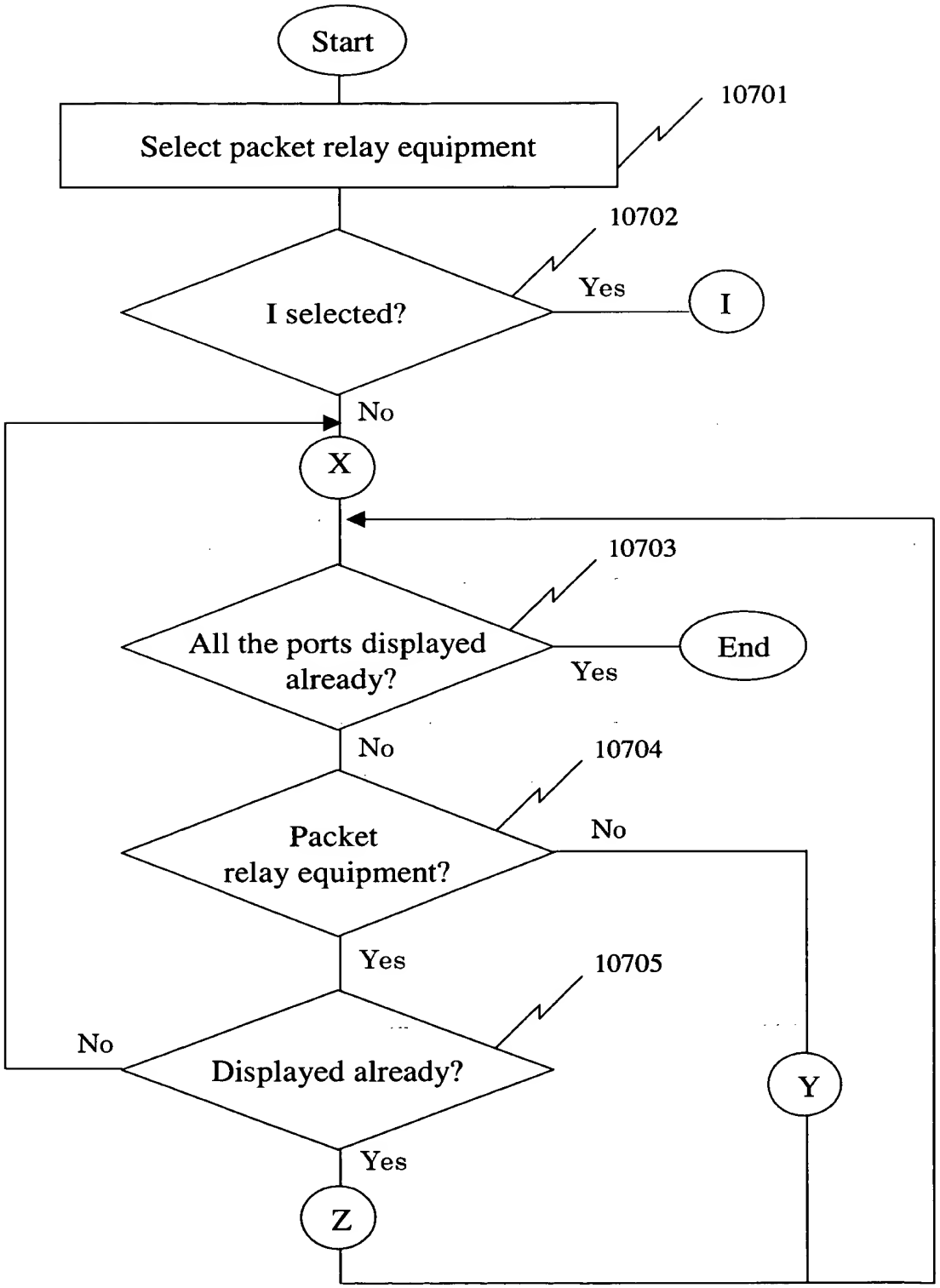

Start
Select packet relay equipment
10701
10702
I selected?
Yes
I
No
X
10703
All the ports displayed already?
End
Yes
No
10704
Packet relay equipment?
No
Yes
10705
No
Displayed already?
Y
Yes
Z

Fig. 108

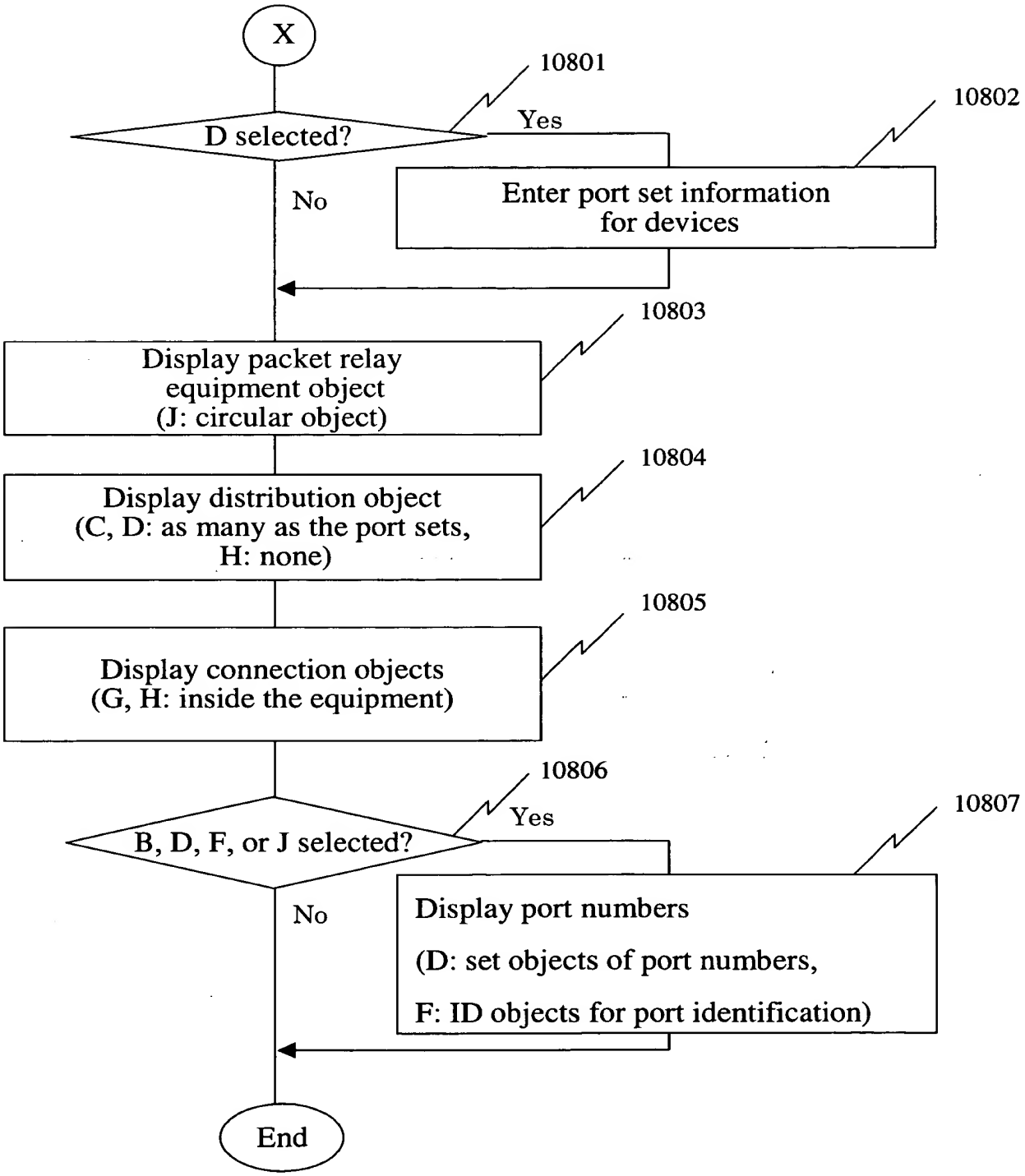

X
10801
D selected?
Yes
10802
No
Enter port set information for devices
10803
Display packet relay equipment object (J: circular object)
10804
Display distribution object (C, D: as many as the port sets, H: none)
10805
Display connection objects (G, H: inside the equipment)
10806
B, D, F, or J selected?
Yes
10807
No
Display port numbers
(D: set objects of port numbers,
F: ID objects for port identification)
End

Fig. 109

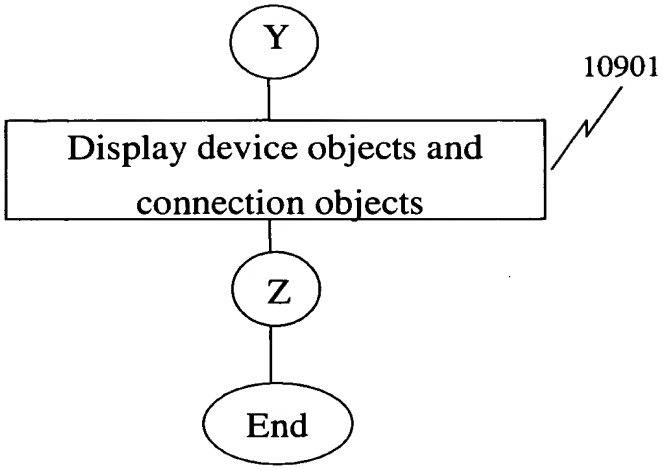


Fig. 110

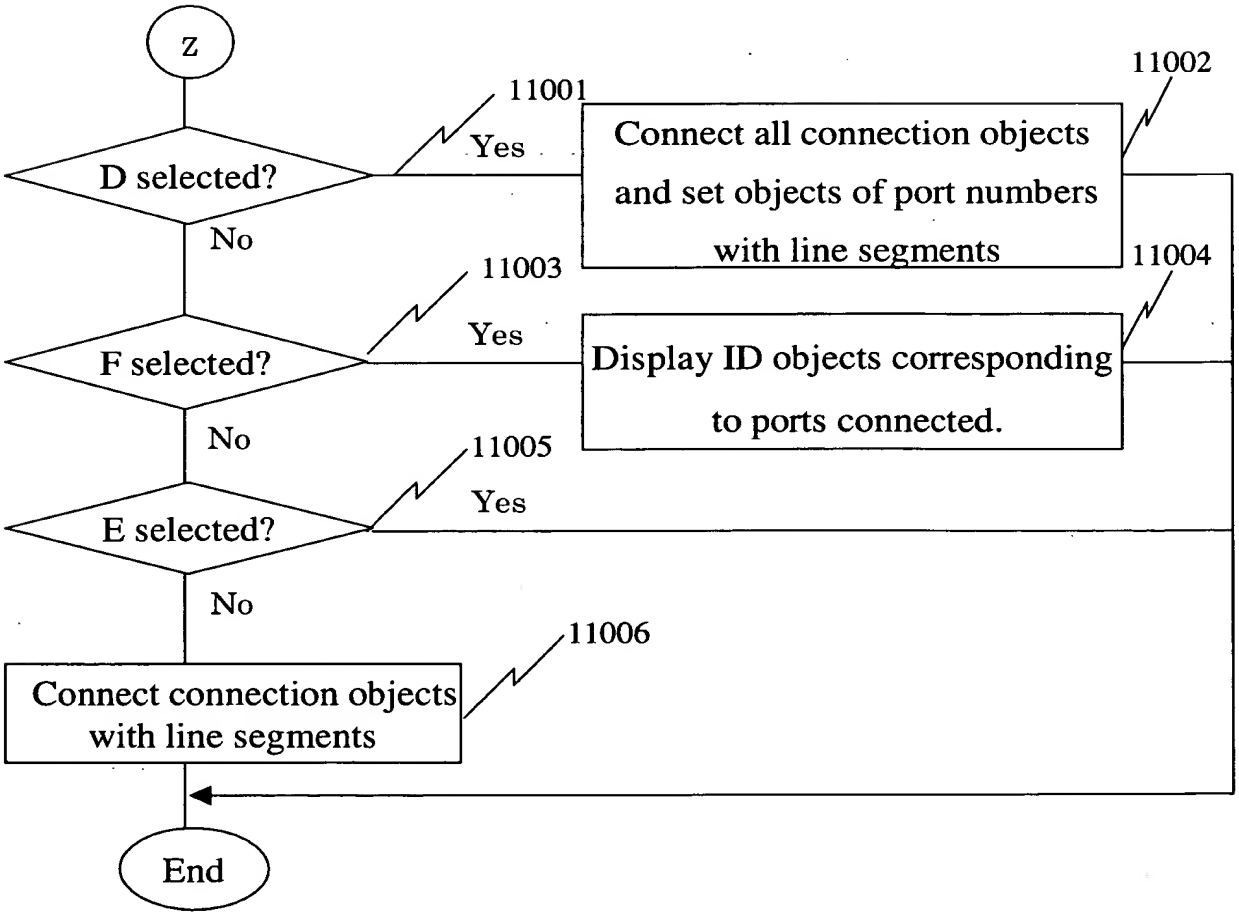


Fig. 111

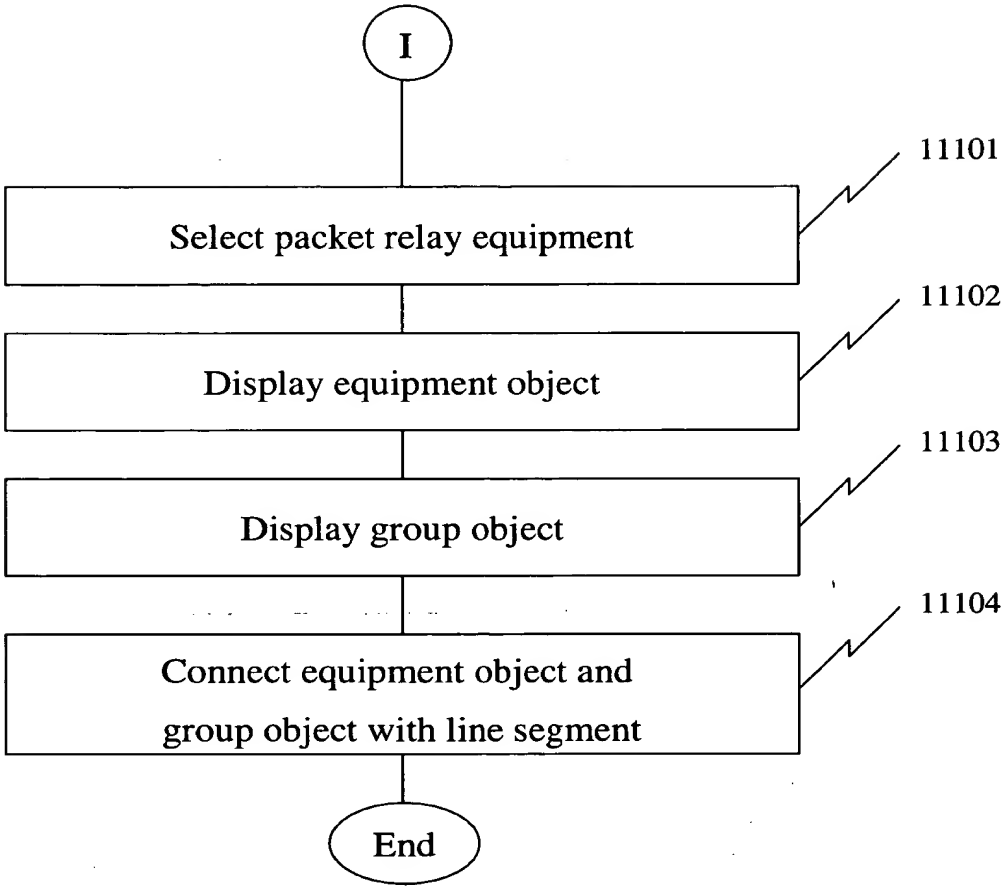
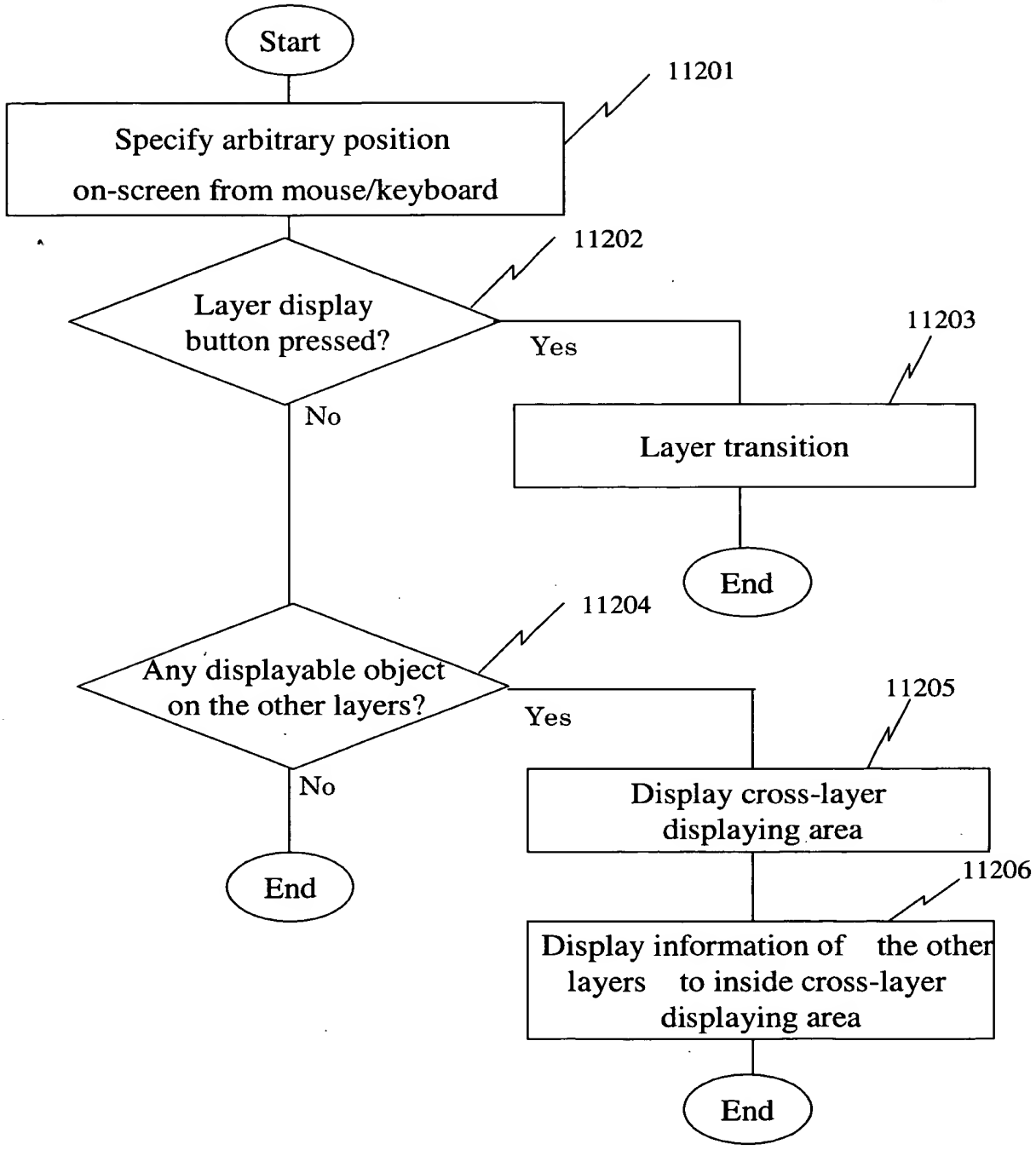

I
11101
Select packet relay equipment
11102
Display equipment object
11103
Display group object
11104
Connect equipment object and
group object with line segment
End

Fig. 112


Start
11201
Specify arbitrary position on-screen from mouse/keyboard
11202
Layer display button pressed?
Yes
11203
Layer transition
End
No
11204
Any displayable object on the other layers?
Yes
11205
Display cross-layer displaying area
11206
Display information of the other layers to inside cross-layer displaying area
End
No
End